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MODERN AGRICULTURE;

OR, THE

PRESENT STATE OF HUSBANDRY

IN

GREAT BRITAIN.

INCLUDING,

AN ACCOUNT OF

THE BEST MODES OF CULTIVATION PRACTISED THROUGHOUT THE ISLAND;

THE OBSTACLES TO FARTHER IMPROVEMENTS;

AND THE MEANS BY WHICH THESE MAY BE MOST EFFECTUALLY REMOVED.

BY JAMES DONALDSON, DUNDEE.

IN FOUR VOLUMES.

VOL. III.

Turn to the arts, the useful pleasing arts
Of cultivation; and those fields improve
Your erring fathers left too long despis'd.
Leave not to ignorance and low-bred hinds,
That noblest science, which in ancient time
The minds of sages and of kings employ'd,
Solicitous to learn the ways of God,
And read his works in agriculture's school.

DODSLEY.

EDINBURGH:

PRINTED BY ADAM NEILL AND COMPANY.

1796.

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MODERN

MODERN AGRICULTURE;

OR, THE

PRESENT STATE OF HUSBANDRY

IN

GREAT BRITAIN.

CHAPTER XVIII.

The Culture of Hops, Hemp, and Flax; and the Uſes to which they are applied.

IN this chapter it is propoſed to treat of ſuch crops, as, although not common, are nevertheleſs cultivated to conſiderable extent in ſome particular diſtricts. Beſides theſe crops above mentioned, the culture of ſeveral others, *viz.* buckwheat, woad, madder, liquorice, &c. as occupying ſome portion of the Britiſh ſoil, ought probably, in ſtrictneſs, to have been deſcribed. But as theſe can never be cultivated

to advantage on a large ſcale, we have purpoſely omitted to mention the modes of their culture; a ſubject which could not be very intereſting to the generality of readers.

The chapter will be found divided into three ſections, as under:

Section I. Of the Culture of Hops.

II. Of Hemp.

III. Of Flax.

SEC-

SECTION I.

The Culture of Hops.

THE hop plant was firſt introduced into England from the Netherlands, about the year 1523. It has a weak jointed ſtalk, with rough leaves, and is of a climbing nature; as when it attaches itſelf to a tree, pole, or other ſupport, it creeps up, in a ſpiral form, to the height ſometimes of twenty feet, and upwards.

Although hops are now conſidered in every part of Great Britain as a neceſſary ingredient in porter, ale, and ſmall beer, yet, when the uſe of them was firſt introduced, they were ſuppoſed to poſſeſs ſome dangerous qualities; and an act of Parliament was accordingly paſſed, in the reign of James VI. prohibiting the uſe of them*.

The cultivation of hops is confined chiefly to the counties of Kent and Worceſter; but in many others, as Eſſex, Suffolk, Nottingham, &c. there are ſome conſiderable plantations; and the writer

* However extraordinary it may appear, this act remains unrepealed; although, by another paſſed in the reign of Queen Anne, it is ordained, That no common brewer, &c. ſhall uſe any bitter ingredient, *inſtead* of hops, on pain of L. 20 penalty.

writer has ſeen a ſmall hop-ground ſo far north as Aberdeenſhire.

There is ſuppoſed to be only one ſpecies of the hop-plant, although there is known to be ſeveral varieties; and theſe, when in flower, of different colours, as red, green, and white. The firſt is beſt adapted to cold unfavourable climates, being more hardy than the others. The green, notwithſtanding it is leſs hardy than the red, is more productive; and the white, which is ſtill more delicate and tender, is the moſt valuable, as beſides being the earlieſt, the produce alſo ſells higheſt at market.

As theſe different varieties of hops become ripe at different periods, the hop-planters are therefore extremely cautious not to mix ſeveral varieties promiſcuouſly in the ſame ground; while, for the ſame reaſon, namely, their ripening at different periods, the farmers find it materially for their intereſt to have the ſeveral ſorts planted either in ſeparate grounds, or detached from each other in the ſame ground. Without this precaution, the picking, drying, &c. of an abundant crop would require a greater number of hands than could be eaſily procured. Whereas, when the crop becomes ripe at different periods, the work goes on with more regularity, and the requiſite number of hands is more eaſily procured.

The

The moſt deſirable ſituation for a hop-plantation, is ground, ſloping gently towards the ſouth, or ſouth-weſt, and ſcreened by means of high grounds, or foreſt-trees, from the north and north-eaſt. At the ſame time, it ought not to be ſo confined as to prevent that free circulation of air, which is indiſpenſably neceſſary where plants grow ſo cloſe together, and to ſuch a height. A free circulation of air, in a hop-ground, not only conduces to the health and vigour of the plants, but alſo prevents the crops from being blighted, or what the hop-farmers call fire-blaſted, which often happens towards the middle of a large cloſe planted hop-ground; while the outſides, in conſequence of the more free circulation of air that there takes place, receive no injury.

The ſoils moſt favourable to the growth of hops, are clay, and ſtrong deep loam; but it is alſo of great importance, that the ſub-ſoil ſhould be dry and friable. A cold, wet, tenacious, clayey, under ſtratum, is found extremely injurious to the roots of the plants, as when they penetrate below the good ſoil, they ſoon become unproductive, and ultimately decay.

In forming a hop-ground, that is, in preparing the land previouſly to planting, conſiderable attention is neceſſary, by fallowing, or otherwiſe to deſtroy the weeds, and to reduce the ſoil to as pulverized a ſtate as poſſible. The ridges ſhould alſo

alſo be made level, and dung applied with a liberal hand.

When it is propoſed to keep the hop-ground clean, by means of ploughing, the plants are ſet in equidiſtant rows; but when the farmer propoſes to extirpate the weeds, by manual labour, the form in which the plants are arranged is not conſidered of ſo much importance, provided ſufficient room be allowed between each plant, or rather each hill, and which in no caſe ſhould be under nine or ten feet from the centre of the one to the centre of the other.

March is the ordinary ſeaſon for ſetting out the plants, and the following is the method in which the operation is performed. The land having been previouſly cleaned and prepared, dung is laid on the field in ſmall heaps near the places where it is propoſed to plant the hop ſlips or ſets. Theſe places are commonly marked off, by placing a number of ſtakes at proper and regular diſtances; that done, ſmall pits are formed, by taking out a ſpit or ſpade depth of earth, and the earth below being gently looſed, a certain quantity, about half a buſhel of dung, is laid thereon, then the earth that was formerly taken out, is again replaced, and ſo much added as to form a ſmall hillock. On this hillock, five, ſix, or ſeven ſets, procured from the roots or ſhoots of the old ſtock, are dibbled in. The plants are placed in a circular form towards the

top

top of the hillock, and at the diſtance of five or ſix inches from each other. They are made to incline towards the centre of the hillock, where another plant is commonly placed. In regard to the plants that are proper, the moſt neceſſary thing to be attended to is, that they have each two joints; from the one which is placed in the ground, ſprings the root, and from the other the ſtalk, provincially the *bind*.

When the ſets are planted, they require no more labour or attention, except keeping the ground around them clean, and free of all ſorts of weeds till towards the end of May, when the young ſhoots having made ſome progroſs, it is common to increaſe the ſize of the hill on which they were planted to a greater ſize than it was when firſt formed, and which is done by adding ſome of the fineſt and richeſt earth from the interſtices. In the end of June, or beginning of July, thoſe farmers who are not ſo avaricious as to ſet poles among the young ſhoots, with a view of reaping a partial crop the firſt year, to the imminent danger of injuring the future produce of the plantation, generally twiſt the young buds into a bunch or knot, ſo that by thus diſcouraging their growth, the roots are enabled to ſpread out more vigorouſly, and to acquire ſtrength previous to the approach of the winter.

The young plantation is treated the ſecond year in every reſpect ſimilar to thoſe of older

ſtanding, with proper management; and when the ſoil is properly adapted to the growth of hops, a plantation will continue in full bearing for twenty or thirty years, all that is requiſite being only to ſupply occaſionally any deficiency of plants that may take place in ſome particular hills.

In the proper management of a hop-ground, great attention is required in order to render it productive. Whether it be kept clear by ploughing, or by the ſpade and the hand-hoe, the ſoil ſhould be turned over at leaſt two or three times in ordinary ſeaſons, and oftener, if any number of weeds appear. The plants alſo require great attention and conſiderable labour. On the return of good weather in the ſpring, the hills are ſpread out in order to give opportunity to prune and dreſs the ſtocks. The earth being then cleared away from the principal roots by an iron inſtrument called a picker, the remains of the former years binds are cut off, together with the ſhoots which were not allowed to attach themſelves to the poles the former ſeaſon, and alſo any young ſuckers that may have ſprung up about the edges of the hills, ſo that nothing is allowed to remain that is likely to injure the principal roots, or impede their ſhooting out ſtrong vigorous binds at the proper ſeaſon. After the roots are properly cleaned and pruned, the hills are again formed, with an addition, if not

not every year, at leaſt every ſecond or third year, of a proper quantity of compoſt manure, that had been previouſly laid in ſmall heaps on the hop ground in the courſe of the winter, or in the early part of ſpring. Soon after the hills are formed, or towards the end of April, the new ſhoots begin to appear, at which time the operation of ſetting the poles commences. Theſe are ſtraight ſlender ſhoots of underwood, aſh, oak, cheſnut, or willow, from ſixteen to twenty feet high. Theſe poles are ſet two, but more frequently three to a hill; they are ſo placed as to leave an opening towards the ſouth, to admit the ſun-beams. The manner of fixing them is by making deep holes or openings in the ground with an iron crow. Into theſe holes the root-ends are put, when the earth is rammed ſo hard about them, that they very ſeldom alter from the poſition in which they were placed, except on occaſion of very violent gales of wind. Great care is neceſſary in placing the poles, and no leſs judgment and experience in determining what ought to be the proper height. When very long poles are ſet in a hop-ground where the ſtocks are too old or too young, or where the ſoil is of indifferent quality, the ſtocks are not only greatly exhauſted, but the crop always turns out unproductive; as, till the binds reach the top, or rather till they overtop the poles, which depends on the ſtrength of the

ſtocks, and the quality of the ſoil, the lateral branches on which the hops grow never begin to ſhoot out or make any progreſs.

After the poles are fixed, a great number of the young ſhoots naturally twine round them, but people are alſo employed to go through the plantation, for the purpoſe of guiding any ſhoots that are taking a wrong direction, and of ſorting them ſo, that only two or three, and theſe the ſtrongeſt and moſt healthy, are permitted to attach themſelves to each pole. All the ſuperfluous binds are cut off, ſo as to prevent their ſpreading over the grounds, or impeding the growth of thoſe that are allowed to ſtand for a crop. The only other operation, neceſſary to be attended to, previous to the commencement of what may be called the hop-harveſt, beſides that of occaſionally cleaning the ground of weeds, is, to tie the binds to the poles. This requires the labour of a number of perſons; women are generally employed, who tie the binds to the poles in ſeveral different places with withered ruſhes, but ſo looſely, as not to prevent the binds from advancing in their progreſs towards the top of the poles. When the binds have got to ſuch a height as to be beyond reaching with the hand, proper perſons go round, and, uſing ſtanding ladders, tie all the binds that appear inclined to ſtray from the poles.

Hops

Hops are known to be ready for pulling when they acquire a ſtrong ſcent, and the ſeeds become firm, and of a brown colour, which, in ordinary ſeaſons, happens in the firſt or ſecond week of September. When the pulling ſeaſon arrives, the utmoſt aſſiduity is requiſite on the part of the planter, in order tha the different operations may be carried on with regularity and diſpatch, as the leaſt neglect, in any department of the buſineſs, proves in a great degree ruinous to the moſt abundant crop, eſpecially in precarious ſeaſons. Gales of wind, at that ſeaſon, by breaking the lateral branches, and bruiſing the hops, prove nearly as injurious as a long tract of rainy weather, which never fails to ſpoil the colour of the crop, and thereby renders it leſs ſaleable at market.

As a preparation for pulling the hops, frames of wood, in number proportioned to the ſize of the field, and the pickers to be employed, are placed in that part of the field, which, by having been moſt expoſed to the influence of the ſun, is ſooneſt ready. Theſe frames, called bins or cribs, are very ſimple in the conſtruction, being only four pieces of boards nailed to four poſts or legs, and, when finiſhed, are about ſeven or eight feet long, three feet broad, and about the ſame height.

A man always attends the pickers, whoſe buſineſs it is to cut over the binds near the ground, and

and to lay the poles on the frames to be picked. Commonly two, but ſeldom more than three, poles are laid on at a time. Six, ſeven, or eight, pickers, women, girls, and boys, are employed at the ſame frame, three or four ranged on each ſide. Theſe, with the man who ſorts the poles, are called a ſet. The hops, after being carefully ſeparated from the leaves, and branches, or ſtalks, are dropped by the pickers into a large cloth, hung all round within-ſide the frame on tenter hooks. When the cloth is full, the hops are emptied into a large ſack, which is carried home, and the hops laid on a kiln to be dried. This is always done as ſoon as poſſible after they are picked, as they are apt to ſuſtain conſiderable damage, both in colour and flavour, if allowed to remain long in ſacks in the green ſtate in which they are pulled. In very warm weather, and when they are pulled in a moiſt ſtate, they will heat in five or ſix hours: for this reaſon the kilns are kept conſtantly at work, both night and day, from the commencement to the concluſion of the hop-picking ſeaſon.

Diligent hop-pickers, when the crop is tolerably abundant, will pick from eight to ten buſhels each in the day, which, when dry, will weigh about one hundred weight. It is common to let the picking of hop-grounds by the buſhel: The price is extremely variable, depending no leſs on the goodneſs of the crop, than on the

the abundance or ſcarcity of labourers. The greateſt part of the hops, cultivated in England, are picked by people who make a practice of coming annually from the remote parts of Wales for that purpoſe. The writer has ſeen hundreds of theſe people travelling acroſs the iſland from Wales to Kent, in queſt of a few weeks employment at hop-picking;—a convincing proof, firſt, how little value they ſet upon their time, and how deſtitute they are of the means of procuring ſubſiſtence in their own country; and, ſecondly, how inattentive the proprietors are, in not taking advantage of that diſpoſition for active employment, which theſe poor people thus evince. He would be a patriot indeed, who would introduce, and exert himſelf to eſtabliſh, ſuch manufactures, and ſuch improved modes of huſbandry, as would give the poor people in Wales conſtant and regular employment in their native country.

Before leaving the hop-ground, it may be proper to mention, that the poles, after being ſtripped of the hop-binds, are carefully ſet up in the manner beſt calculated to defend them from receiving any injury during winter.

The form of the kilns uſed for drying hops is not materially different from that of thoſe uſed for drying malt. The hops are ſpread on a haircloth, and from eight to ten, ſometimes twelve, inches deep, according as the ſeaſon is dry or wet, and depending alſo on the ſtate of the hops in

in regard to ripeneſs. A thorough knowledge of the beſt method of drying hops can only be acquired by long practice. The general rules are, to begin with a ſlow fire, and to increaſe it gradually, till, by the heat on the kiln, and the warmth of the hops, it is known to have arrived at a proper height. An even ſteady fire is then continued for eight or ten hours, by which time, the ends of the hop-ſtalks become quite ſhriveled and dry, which is the chief ſign by which to aſcertain that the hops are properly and ſufficiently dried. They are then taken off the kiln, and laid in a large room or loft, till they become quite cool; they are then in condition to be put into bags, which is the laſt operation the planter has to perform previous to ſending his crop to market.

In the floor of the room where the hops are laid to cool, there is a round hole or trap in the floor, equal in ſize to the mouth of a hop-bag. After tying a handful of hops in each of the lower corners of a large bag, (containing four ells and a half of ell-wide cloth), which ſerve afterwards for handles, the mouth of the bag is fixed ſecurely to a ſtrong hoop, which is made to reſt on the edges of the hole or trap; and the bag itſelf being then dropped through the trap, the packer goes into it, when a perſon, who attends for the purpoſe, puts in the hops in ſmall quantities, in order to give the packer an opportunity

portunity of packing and tramping them as hard as poſſible. When the bag is filled, and the hops tramped-in ſo hard as that it will hold no more, it is drawn up, unlooſed from the hoop, and the end ſewed up, other two handles having been previouſly formed in the corners in the manner already mentioned.

The produce of hop-grounds has been as variouſly ſtated as the expence of management, and other charges; and the truth is, that on theſe ſubjects there are ſcarcely two farmers who will be found to agree even in the more important particulars.

The general average-produce for a number of years may be rated at from ſeven to ten hundred weight; but there is no crop cultivated in Great Britain, of which the returns by the acre are more precarious and uncertain than that of hops. A medium crop, owing to the heavy load of expence, does not yield the cultivator a return at all adequate to his expence and riſk, a bad one is a very loſing concern. Sometimes the produce of a particular hop-plantation is extraordinarily great, while the general crop is very indifferent.

Mr Young, in his Annals of Huſbandry, vol. ii. p. 76. mentions, that a farmer in Kent, in the year 1783, netted L. 1100 of clear profit from the produce of eighteen acres and a half, or L. 59 : 9 : 2 the acre. It is owing to this

circumſtance, namely, that it is known there are ſuch prizes in the lottery, that ſo many people devote their chief attention to the cultivation of hops. Many ſenſible people, however, reflecting, that ſuch capital prizes can only fall to the lot of a few, and that the price of a chance, (the expence of forming the hop-ground, and the annual charge of management), is greater than a prudent man, under ſuch circumſtances, ought to riſk, have lately grubbed up their plantations, and converted the lands into tillage or paſturage; others, again, poſſeſſing more of the ſpirit of adventure, have acted on principles diametrically oppoſite, in ſo much, that the number and extent of hop-grounds have, of late years, greatly increaſed.

The expence of management, including tithes, duty, renewal of poles, &c. is ſeldom leſs than L. 20, and very frequently amounts to L. 35 the acre, according to the rate of labour in the diſtrict, and the eaſe or difficulty of procuring poles. The manner in which the grounds are kept clean, whether by manual labour, or chiefly by the plough, and many other particulars, tend to augment or decreaſe the expence of management, ſo much as to render it difficult, if not impoſſible, to ſtate generally what will apply to any particular caſe.

There are no doubt numerous ſituations in Great Britain, where the culture of hops is unknown

known, but in which that plant would grow in as great perfection as in any of the diſtricts at preſent moſt famous for the quantity and quality of the hops which they produce. At the ſame time, it is extremely doubtful how far it would be profitable, either to the community, or to individuals, were a ſtill greater portion of the Britiſh ſoil occupied as hop-plantations. The crop now annually cultivated appears, (from the cleareſt of all evidence, the gradual fall of prices in ordinary ſeaſons), to be at leaſt fully equal to the demand; while the very great advance in the price of labour, and of poles, which are both expenſive and periſhable articles, reduces the profits of hop-planters beyond what were derived from this branch of huſbandry by thoſe of former times. That moſt grievous and oppreſſive of all taxes, *tithes*, as it operates ſo powerfully in reducing the nett profits of a hop-plantation, ought alſo to deter new adventurers. Who, that reflects coolly on the ſubject, will, beſides the firſt coſt of forming the plantation, expend L. 20, perhaps L. 25, or L. 30 a-year on the culture of an acre of ground, when he knows that the tenth part of the produce is to fall to the ſhare of the tithe-owner? The proſpect of profit ought indeed to be great when liable to ſo great a deduction.

The cultivation of hops in a national point of view, is attended with conſiderable advantage,

as from ten to twelve *per cent.* on the groſs value of the crop is paid to Government. This, when the crop is abundant, amounts to a very conſiderable revenue.

The chief uſes to which hops are applied, have already been mentioned. It is ſaid, that in Sweden, cloth of a very ſtrong fabric is made from the rind or ſkin of the hop-binds. The method of preparing it, is ſomewhat ſimilar to that practiſed in the management of flax and hemp, which will be explained in the following ſections. Should this practice ever be introduced and adopted on a large ſcale in Great Britain, or ſhould a method be found out, whereby hop-binds could by a ſimple proceſs, and at a ſmall expence, be converted into paper, hop-plantations may then be extended with a probability of ſucceſs; but under the exiſting circumſtances, it certainly would be improper, as the meaſure could not fail to be againſt the intereſt of every individual at preſent concerned in hop-grounds, while there ſeems no good reaſon to expect that the nation or the new adventurers would be benefited.

SEC-

SECTION II.

The Culture of Hemp.

ALTHOUGH Pliny takes notice of hemp, in his Natural Hiſtory, and mentions particularly the making of ſail-cloth, cordage, &c. from flax, yet he ſays nothing about hemp being uſed in the ſame way. Hence it may be inferred, that the ancients were ſtrangers to the valuable purpoſes to which it might be applied.

Hemp is cultivated to a greater extent in almoſt every other kingdom in Europe, than in Great Britain; and in Ruſſia, probably, more than in any other, as it is from that kingdom that the Britiſh merchants and manufacturers are chiefly ſupplied.

Hemp, it is believed, has ſcarcely ever been cultivated in the open fields in Scotland; at leaſt, in all the courſe of the writer's travels through various diſtricts, he never ſaw any, excepting ſome ſmall patches in cabbage-gardens, belonging to poor people. In England it is very different: He has ſeen fields of ſeveral acres under hemp, in the counties of Suffolk, Cambridge, and Lincoln; and a conſiderable quantity of it is alſo cultivated in Dorſet, Worceſter,

ceſter, and ſome other diſtricts. It therefore becomes neceſſary and proper, to claſs this plant among the productions of the Britiſh ſoil.

The ſoil which produces hemp in the greateſt plenty and perfection, is a deep free loam. It is, notwithſtanding, frequently cultivated on ſoils, that have a conſiderable portion of clay in their compoſition.

A complete ſummer-fallow is conſidered, in ſome diſtricts, as neceſſary, previous to ſowing hemp; but the more general practice is, to ſow it after ſome white-corn crop. In the latter caſe, the land, for the moſt part, receives three ploughings; one in the end of harveſt, immediately after the preceding crop has been removed; one early in ſpring; and the third, before the ſeed be ſown. Before the laſt ploughing, dung, (an article which, in hemp-huſbandry, is regularly applied), is laid on, at the rate of ſixteen or twenty cart-loads; each load drawn by three horſes.

The ordinary hemp-ſeed time, is from the end of April to the end of May; but the end of April, or beginning of May, are found, from experience, to be the beſt ſeaſons; as when the ſeed is early ſown, the crop acquires greater ſtrength, and is conſequently better able to undergo the various operations of watering, graſſing, breaking, &c. all which muſt neceſſarily be performed,

performed, before it be put into the hands of the manufacturer.

The uſual quantity of ſeed allowed to the acre, is from two to three buſhels; two and a half may be conſidered as the common allowance to ſoils of ordinary quality.

It has been formerly remarked, that hemp is ſown on fallow, and alſo after any ſort of white-corn crop. It may be further obſerved, although it will no doubt appear remarkable, that it is frequently cultivated on the ſame field for ten, fifteen, and ſometimes twenty, and Mr Young ſomewhere ſays ſeventy years together, without any other ſort of crop intervening; at the ſame time, from the circumſtance of its having been found neceſſary to manure the land every year, there can remain no doubt of its being a robbing crop.

When the ſeed is ſown, and the land properly harrowed, the crop requires no further attention, till it be ready for pulling; it being one peculiar property of this crop, that, owing to its completely covering the ſurface, it deſtroys weeds of every deſcription.

In cultivating hemp, it is particularly neceſſary to attend to one circumſtance, namely, that there are two kinds always in the ſame field; the one called the male, and in ſome places the fimble, hemp, which is barren, and the female, which carries ſeed. Theſe two kinds become

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ripe at different periods; the firſt in the month of July, the other not till September. Some cultivators of hemp pull both ſorts together. This practice is obviouſly wrong; as pulling the ſeed-bearing hemp nearly two months before it comes to maturity, muſt materially injure the crop, both to the farmer and conſumer; to the former, by leſſening the quantity, and to the latter, by injuring the quality, and thereby rendering it leſs durable. Accordingly, in thoſe diſtricts where the proper management of hemp is beſt underſtood, the male ſtalks, or thoſe that do not bear ſeed, are drawn out, when the colour changes, and becomes a pale yellow; by which time, a few of the leaves begin to drop off. The female hemp is allowed to remain till it aſſume the ſame appearance, when, if it be not intended to preſerve the ſeed, it is alſo drawn. When the preſervation of the ſeed becomes an object, the crop is allowed to ſtand, till, by inſpecting the ſeed, it be found to have arrived at a proper ſtate of maturity.

The ſtalks of hemp and flax, in place of being mown, or cut with ſickles like corn, are drawn out by the roots, with the hand. The expence, like that of all other agricultural labour, is very variable, and very different in ſome diſtricts from what it is in others. In ſome places, pulling an acre of hemp coſts nineteen or twenty ſhillings, while in others, the operation is performed

formed in as complete a manner for twelve or thirteen.

The management of a crop of hemp is alſo different in different diſtricts. In ſome it is what is called dew-ripened. In others, it is immerſed in water, immediately after being pulled. In the former caſe, the new-pulled hemp is carefully and thinly ſpread, either on a ſtubble field, or on ſome old paſture-land, where the graſs is not apt to grow luxuriant. In this ſituation it remains, being however frequently turned, for five or ſix weeks, or till the reedy or woody part of it become ſo brittle, that, by means of the breaking machine, conſtructed for the purpoſe, it is made to part from the rind, or hempy ſubſtance. It is then taken up, tied in bundles, and either ſtacked, or carried home to be manufactured, in the manner to be after deſcribed.

The other method of managing hemp after it is pulled, is, to tie it up immediately in ſmall bundles, and thereafter to put it into ponds of ſtagnating water, where it remains for five or ſix, or more days, according to the ſtate of the weather; after which it is taken out, and ſpread in the manner already mentioned. This laſt method, which is moſt commonly followed, is adopted in order to ſhorten the proceſs of graſſing, and which both hemp and flax muſt undergo, in order to make the rind, or what is frequently

quently called the harl part from the reed or ſtalk, as no other method has yet been diſcovered, by which this can be ſo well effected. The immerſing hemp or flax for ſome time in water, is the beſt mean that can be uſed, not only for making the harl ſeparate more eaſily, and more completely, from the reed, but alſo for rendering leſs violent means, in breaking and ſcutching, neceſſary for effecting that purpoſe. A very tedious and expenſive proceſs, in bleaching the yarn, when it is to be converted into any of the finer articles of manufacture, is alſo by this means greatly ſhortened, and conſequently becomes leſs troubleſome. For theſe reaſons, hemp managed in the manner laſt mentioned, always ſells for eighteen-pence or two ſhillings the ſtone higher than that which is dew-ripened.

When it is propoſed to ſave the ſeed, the crop of hemp, after being pulled, is bound up in ſheaves, or bundles, and ſet up in ſhocks, for eight or ten days, by which time, in good weather, the ſeeds become ſo dry and firm, as to be eaſily thraſhed out, which is done with a flail, and, for the moſt part, on cloths in the field. After the ſeed is thraſhed out, the hemp is either ſpread directly on ſome adjoining field, or laid in water, as one or other of the methods of management above deſcribed be adopted.

After the hemp has been taken up from the graſs, men are employed to break it, with a clumſy

clumſy machine, nearly ſimilar to thoſe formerly uſed in Scotland for breaking flax. It is then ſwingled or ſcutched, ſo as to make the reedy ſubſtances part from the ſkin or bark. Theſe operations performed, the farmer's labour ceaſes, and that of the manufacturer commences.

It is worthy of remark, eſpecially for the information of an Engliſh reader, that although the method of breaking and ſcutching flax in Scotland, about thirty years ago, was the ſame as above mentioned, yet that now, in almoſt every diſtrict of that kingdom where flax is cultivated, proper mills, moved by water, are erected for the purpoſe. The breaking is performed very completely, by paſſing the flax, in ſmall handfuls, once or twice between two large fluted wooden-rollers; and the ſcutching, by ſcutchers fixed to a large horizontal wheel, which moves with great velocity. After the flax has been broken, by paſſing once or twice between the rollers, the millers hold firſt one end of the bunches, or handfuls, to the ſcutchers, and then the other; by which means, all the reedy part, provincially the "ſhows," flies off, and the flax is rendered fit for the merchant or the manufacturer. Conſidering the great additional price of labour in England, beyond what it has yet arrived at in Scotland, it is ſurpriſing that, in thoſe diſtricts in the former kingdom, where ſo much hemp and flax is annually cultivated, none of theſe

mills have hitherto been erected. Where the rate of manual labour is ſo high, and the demand for labourers ſo great, every proper mean ſhould be uſed to keep the one within proper bounds, and to render the other leſs preſſing; and no meaſure, it is well known, is better calculated to furniſh immediate relief in either caſe, than erecting ſimple and well-conſtructed machinery.

The average produce of a crop of hemp, when made ready for the heckle, in which ſtate it for the moſt part goes out of the hand of the cultivator, is from thirty-eight to forty ſtone, of fourteen pounds to the ſtone. The price, beſides a bounty allowed by an act of Parliament paſſed in the year 1782, is from 7 s. to 8 s. the ſtone. The ordinary quantity of clean ſeed produced on the acre, is from eleven to twelve buſhels, and the price from 4 s. to 5 s. the buſhel.

Hemp is frequently ſold on the ground when ready for pulling. When it is diſpoſed of in this manner, the price is ſeldom under L. 6 the acre, and rarely exceeds L. 8. If ever the cultivation of hemp becomes general in theſe kingdoms, which, however, in the writer's apprehenſion, is extremely doubtful, there is no period at which the farmer can diſpoſe of the crop with greater advantage to himſelf, or to the community, than immediately before it be pulled. By ſelling it at that period, he is relieved from the performance of all theſe tedious and haraſſing operations,

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which are neceſſary afterwards to be attended to, before it can be made fit for the market. Many of theſe, as they fall to be performed during the buſy ſeaſon of the year, it is difficult, often impoſſible, for the moſt active farmer to accompliſh, without neglecting other matters, on a proper attention to which, his own and his family's intereſt more immediately depends.

When crops of hemp or flax are diſpoſed of before they be pulled, the poor people in the neighbourhood, whoſe time is not fully occupied, are greatly benefited. They, in general become the purchaſers, and as they water, graſs, break, ſcutch, and heckle it themſelves, and for the moſt part ſpin it into yarn before they offer it for ſale, they are by that means furniſhed with ſeveral months employment, while the ſurplus price of the manufactured commodity affords them full compenſation for their labour.

The hemp cultivated in England, which is conſidered ſuperior in quality to any imported, is converted to many uſeful purpoſes, as ſhirting, ſheeting, table-linen, ſail-cloth, pack-thread, fiſhing-nets, and cordage of all ſorts.

Notwithſtanding the average value of a crop of hemp by the acre is as above ſtated, and that the bounty allowed by Government amounts frequently to 15s. or 20s. the acre, yet the cultivation of it does not ſeem to increaſe. The very minute attention requiſite in the management of

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it, from the time it is ready for pulling, till it be put into the hands of the manufacturer; the expence of labour, compared with the gross produce, great as it is; the difficulty of procuring labourers at the periods when the most tedious operations fall to be performed; added to the immense quantity of manure which must be annually applied; will, in all probability, deter the British farmers, especially where the crop cannot be sold before pulling, from cultivating hemp on a large scale. It may indeed be cultivated with advantage to the farmers, and the culture of it prove beneficial to the peasantry in some populous districts where the labouring classes are not fully employed, provided they become the farmers merchants. But, in a national view, it is by no means clear, considering the situation Great Britain has been in for a number of years, respecting bread-corn, that the cultivation of hemp ought to be considered a lucrative branch of British husbandry. The writer's reasons for holding this opinion will be more fully explained in the conclusion of the following section. It is only necessary here to observe, that this opinion he acknowledges is different from that of many who have before written on the subject of British husbandry; but the difference arises from the change of circumstances. Formerly the balance of the corn-trade was in favour of this country, a much greater quantity being export-

ed in a courſe years, than in ſome particularly unfavourable ſeaſons it was found neceſſary to import. Now the caſe is greatly altered. It has been aſcertained by high authority, (the King's Privy Council), that for a courſe of years, the crops raiſed in Great Britain, were not in ordinary ſeaſons by any means ſufficient for the ſupply of the inhabitants.

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SECTION III.

The Culture of Flax.

ALL writers on huſbandry, both ancient and modern, agree, that flax is a robbing crop, and that it exhauſts the ſoil to a great degree.

Flax, Pliny ſays, was cultivated, in his time, chiefly for the purpoſe of making ſails and cordage for ſhips. He expreſſes himſelf to this effect: "What greater miracle, than that there ſhould "be a plant that makes Egypt approach nearer to "Italy:"—"That there ſhould grow from ſo "ſmall a ſeed, and upon ſo ſlender and ſhort a "ſtalk, that which, as it were, carries the globe "itſelf to and fro." He alſo informs us, very particularly, of the proceſs of flax-huſbandry, as then practiſed in Italy, where that plant, as well as hemp, is ſtill cultivated to a great extent. The farmers, he ſays, knew when the crop was ready, by two marks, namely, the ſwelling of the ſeed, and the ſtalks becoming of a yellow colour towards the roots. When ripe, it was pulled, bound into ſmall bundles, and dried in the ſun. It would appear, that, in the courſe of drying, the ſeeds, owing to the great influence

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of the ſun, dropped off naturally. The ſtalks, after being freed from the ſeeds, were ſteeped a certain time in water; the period they ſhould remain, in this ſituation, was determined by the bark or harl, which is the flaxy ſubſtance, parting eaſily from the boon or woody part of the plant. When, by trial, it was found to have arrived at that ſtate, it was taken out of the water, and, after being dried, was bruiſed or broken on a ſtone with a mallet, and afterwards combed in iron-heckles, till it was entirely freed from the boon; and, in the courſe of combing or heckling, the moſt valuable was ſeparated from that of inferior quality. In a word, the method of managing a crop of flax in Pliny's time, and in the country where he reſided, was not very unlike that which is now practiſed in Great Britain.

This author mentions two very extraordinary kinds of flax: The one, which he ſays grew in the torrid ſands of India, that would not burn with fire; and the other, as being of a remarkable fine and ſtrong quality. Tablecloths were made of the former, ſome of which he had ſeen thrown into the fire as they were taken from the tables after an entertainment, and which were thereby cleaned better, and made brighter than could have been done by water*. The other kind

* Such cloth is ſtill made for curioſity, from the *aſbeſtos*, or earth flax. What Pliny had ſeen was probably of this ſort.

kind was made into ſnares for catching fiſhes and birds, which, he tells us, were ſo ſtrong as to entangle bears, and alſo ſo hard as to reſiſt the edge of a ſword, while, at the ſame time, they were ſo fine, as to paſs, together with the ropes at the upper and under ſides, through the ring of a man's finger.

The ſoil moſt proper for flax, is a deep free loam, ſuch as is not apt to be overcharged with moiſture, nor, in ordinary ſeaſons, to become too dry. Flax is ſown after all ſorts of crops, but is found to ſucceed beſt on lands lately broken up from graſs. In Scotland, the moſt ſkilful cultivators of flax generally prefer lands from which one crop of grain only had been taken, after having been ſeveral years in paſture. When ſuch lands have been limed or marled, immediately before being laid down to graſs, the crop of flax ſeldom or never miſgives, unleſs the ſeaſon prove remarkably adverſe.

In regard to the choice of ſeed, that which is of a bright browniſh colour, oily to the feel, and, at the ſame time, weighty, is conſidered the beſt. Lint-ſeed, imported from various countries, is cultivated in theſe kingdoms. That brought from Holland is in higheſt eſtimation, as it not only ripens ſooner than any other that is imported, but alſo produces greater crops, and flax of that quality which beſt ſuits the chief manufactures of the country. American ſeed produces, in common, fine flax, but neither the quantity of

flax,

flax, nor of the pods, provincially the "bolls," which contain the ſeeds, is ſo large as the produce from Dutch lint-ſeed. Riga ſeed yields a very coarſe ſort of flax, but a greater quantity of ſeeds than any other.

It is common in ſome parts of Scotland to ſow ſeeds ſaved from the crop of the preceding year, eſpecially when that crop was raiſed from ſeed imported from Holland. The ſucceſs of this practice is found to depend greatly on changing the ſeed from one ſort of ſoil to another of an oppoſite nature; but the ſaving in the expence of purchaſing that ſort of ſeed, in place of what is newly imported from Holland, is ſo inconſiderable, and the riſk of the crop miſgiving ſo much greater in the one caſe than in the other, that thoſe only who are ignorant of the conſequences, or who are compelled from neceſſity, are chargeable with this act of ill-judged parſimony.

The quantity of ſeed uſed, varies; from two buſhels, to two buſhels and a half, the Engliſh ſtatute-acre, is the ordinary allowance. In determining the proper quantity neceſſary for the acre, it is requiſite to pay great attention to the condition of the land. When the land is rich and fertile, and the ſeaſon ſo favourable that it can be got thoroughly pulverized, if too much ſeed is ſown, the crop is in great danger of lodging, and when that happens, particularly before the pods are formed, the flax proves incon-

ſiderable in quantity, and very inferior in quality.

The ordinary ſeaſon of ſowing flax-ſeed is from the middle of March to the middle or end of April, but the laſt week of March, and the firſt ten days of April, is eſteemed the beſt time: and, accordingly, within theſe periods, the greateſt quantity of flax-ſeed is ſown in both kingdoms.

Flax, when young, is a very tender plant, and is more eaſily injured and checked in its progreſs by weeds than any other that is uſually cultivated in the fields. For this reaſon, it is indiſpenſably neceſſary, in order to ſecure a good crop, either to prepare the land very carefully, by repeated ploughings and harrowings, and by carrying off or burning the weeds, before ſowing the ſeed, or to be at the expence of a troubleſome and tedious hand-weeding afterwards. When the latter method of cleaning the land is adopted, the operation ſhould be performed when the flax is about three or four inches high, and all the weeds ought to be carefully picked up, and carried off the field. When flax is cultivated by the cottagers and the poorer tenants, who poſſeſs not the means of cleaning and preparing the land in a proper manner before ſowing the ſeed, weeding in ſuch caſes becomes an arduous taſk. Women are always employed; they generally ſit or lie down and pick out every weed they ſee. If the value of time were conſidered,

ſidered, or the price of labour aſcertained, the tedious and expenſive mode adopted for weeding flax, when cultivated in ſmall quantities, would deter any ſenſible perſon from the attempt; in ſome counties in England, where the price of labour is extremely high, the expence of weeding an acre of flax, if performed in the ſame tedious way it is done in ſome parts of Scotland, would coſt 30 s. or 40 s. the acre; and with the expence of the other requiſite labour, would amount to fully a half of the groſs value of the crop.

When flax is cultivated by farmers on a large ſcale, the lands being under a regular courſe of cropping, and properly cleaned and pulverized before the ſeed is ſown, the buſineſs of weeding, if at all neceſſary, is performed by few hands, in a ſhort ſpace of time, and at little expence.

Thoſe who uſually cultivate flax have ſeveral marks by which they determine, with conſiderable accuracy, when it is ready for pulling. That which is the moſt obvious, is its changing from a green to a brown, or rather yellow colour; when this alteration in the colour becomes diſcernible, the crop ſhould be pulled without loſs of time.

A crop of flax frequently grows ſhort, and runs out a great number of ſeed-bearing branches. When that is the caſe, the ſeeds, not the flax, ought

ought to be the farmer's chief object; and the crop ſhould be allowed to ſtand till the ſeeds are in a great meaſure perfected.

When the crop thrives, and is likely to become more valuable for the flax than the ſeeds, it ſhould be pulled ſoon after the bloom drops off, and before the pods turn hard and ſharp in the points.

In pulling flax, it is uſual, when it is intended to ſave the ſeeds, to lay it in handfuls, partly acroſs each other; the reaſon for which, is, that the buſineſs of rippling is thereby facilitated, as the ripplers, in place of having to ſeparate each handful from the bundle, find it by this ſimple precaution, already done to their hand.

Although it is of much importance, yet it very ſeldom happens, that much attention is beſtowed to ſeparate the different ſorts of flax from each other, in pulling the crop.

In moſt fields, there are varieties of ſoils; of courſe ſome parts of a field will produce fine flax; others coarſe; ſome long, and ſome ſhort: in a word, crops of different lengths and qualities. It cannot be ſuppoſed, that all theſe ſorts of flax will undergo an equal degree of watering, graſſing, breaking, and heckling, without ſuſtaining great injury. Therefore, when flax of various qualities is promiſcuouſly mixed together in pulling, it is impoſſible to

prevent ſome part of it from being loſt in the after-management; a loſs which might be avoided with a ſmall ſhare of attention, and ſome additional trouble when the crop is pulled. Thoſe who rent flax-mills are often blamed for embezzlement; but there is great reaſon to believe, very unjuſtly. Becauſe the crop of a particular part of a field yields ſuch a quantity of flax from one mill, it does not follow, that the manager of another mill ſhould return an equal quantity from the ſame ſpace, probably, of very inferior land. It is certain, in very many caſes, that the inattention of flax-farmers to the above very neceſſary precaution, is the cauſe why crops of flax often turn out of ſo little value, and is the principal reaſon why the proportion of tow or inferior flax ſo often exceeds in ordinary ſeaſons that of ſuperior quality; the millers and hecklers being obliged, in the courſe of their operations, owing to the mixed ſtate in which they receive the crop from the grower, to reduce the quality of the whole to a lower ſtandard than there would be any occaſion for, were the different qualities ſorted, and put into their hands in that ſtate.

After the crop is pulled, the pods containing the ſeeds are forced from the ſtalks by means of an iron-comb, called a ripple, fixed on a beam of wood, on the ends of which two perſons ſit, who, by pulling the ſeed-end of the flax repeatedly

peatedly through this comb, execute the buſineſs in a very complete manner. When the flax is rippled, which is always done immediately after it is pulled, it is tied in ſmall bundles, and put into pools of ſtagnating water, where it is allowed to remain ſeveral days, according to the natural warmth of the water. As ſoft clear ſtagnating water has been found by long experience to be ſuperior for the purpoſe to any other; where that cannot be obtained without art, a pit or canal is commonly formed, adjoining to a river or ſtream, whence water can be eaſily brought. This pit or canal is filled with water for ſome time, a week or two, before it be propoſed to pull the flax; by this means the water acquires a greater degree of warmth than river-water poſſeſſes, and which contributes greatly to facilitate the object farmers have in view in immerſing green flax in water, namely, to make the harl or flaxy ſubſtance part eaſily and completely from the boon.

The period that flax ought to remain in the water, depends on various circumſtances; as the ſtate of ripeneſs in which it was pulled, the quality and temperature of the water, *&c.* The moſt certain rule by which to judge when flax is ſufficiently watered, is, when the boon becomes brittle, and the harl ſeparates eaſily from it.

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Although it is the general practice where flax is cultivated in Great Britain, to immerſe it in water for ſome time after it is pulled; yet in Dorſetſhire, and in that neighbourhood, it is ſeldom done. There the flax is allowed to arrive at that ſtate in which the harl parts moſt eaſily from the boon, by a more gradual proceſs, that of dew ripening, which was deſcribed when treating of the management of hemp. This, it will be obſerved, is nothing more than expoſing the flax to the influence of the weather, for a longer period than is neceſſary when the operation of watering has been previouſly performed.

Sometimes, if the ſteeping be judged ſufficient for effecting the ſeparation of the harl, little more is done, than putting it up in parcels, or ſpreading it on the ground to dry. After ſteeping the flax, the only other opesation which properly falls under the farmer's attention, is graſſing it. It is commonly ſpread very thin on the ground, and in regular rows; the one being made to overlap the other a few inches, with a view of preventing, as much as poſſible, its being torn up and ſcattered by gales of wind. Old graſs ground, where the herbage does not grow to any great height, is the beſt for the purpoſe; as, when the graſs or weeds ſpring up ſo as to cover the flax, it is frequently rotted, or at leaſt greatly injured thereby. Flax is allowed to remain on the ground till, by repeated

peated trials, it is found that the boon has become very brittle, ſo that, on being broken, and rubbed between the hands, it eaſily and freely parts from the haul. It is then taken up; a dry day being choſen for the purpoſe; and, being bound in ſheaves, is either ſent directly to the mill, which is the uſual practice in Scotland, or in England broken and ſcutched, in the manner they do hemp.

Thoſe who beſtow moſt attention on the cultivation of flax in Scotland, generally ripple off the ſeed, even when there is no intention of ſaving it; as it is found, when flax is put into water without taking off the pods, the water ſoon becomes putrid, in conſequence of which, the flax is greatly injured.

When it is propoſed to ſave the ſeeds of flax, the pods are carried home from the field, ſo ſoon as they are ſeparated from the flax; and either laid on cloths, and expoſed to be dried by the influence of the ſun, or they are ſpread on barn floors, and turned two or three times a day, till they are ſo dry, that the ſeeds can be eaſily thraſhed out in the ordinary way. This is the general mode adopted in Scotland. In Dorſetſhire, they allow the flax to lie on the field after it has been pulled, till the pods become ſo dry, that the ſeeds can be thraſhed out with a ſtick; and which is done on a board, or log of wood, placed on the field for the purpoſe.

The

The quantity of ſeed produced on the acre, Engliſh meaſure, is from ſix to eight, ſometimes as high as ten or twelve, buſhels. The price depends, in a great meaſure, on that of foreign ſeed imported; as, when ſold to oil-makers, the price is generally about one half of that of Dutch ſeed ſold for the purpoſe of ſowing. The price of home-cultivated lintſeed is conſiderably advanced of late, in ſome of the ſouthern and weſtern counties of England, beyond what it is in Scotland, owing to the circumſtance of its being much uſed as food for fattening cattle; and which, when boiled to a ſort of jelly, and mixed with malt-grains, chaff, or bran, is found to anſwer extremely well. The average price of the lintſeed cultivated in theſe kingdoms at large, cannot be rated higher, than from three to four ſhillings the buſhel. Oil-cake, or the refuſe of the ſeeds of lint, hemp, and rape, after the oil has been expreſſed from them, is alſo a valuable article, as food for cattle, and much uſed in England; although, hitherto, but in ſmall quantities in Scotland. The price varies in different diſtricts, according to the demand; the general average may be, from L. 3 to L. 4 the ton.

There are few crops more variable, in quantity as well as quality, than flax. When ſold before pulling, which is commonly the caſe in Scotland, when cultivated on a large ſcale, the

price runs between L. 6 and L. 10 the Engliſh acre; but L. 7, 10 s. may probably be rather a high average.

It is uſual for farmers, in different parts of Scotland, who rent lands in the neighbourhood of towns and villages, to let a field to the inhabitants, for the purpoſe of growing flax. This, for the reaſons mentioned in the former ſection, is the moſt advantageous mode in which this crop can be cultivated. The rent affixed on the land, is about L. 3, 10 s. or L. 4, the Engliſh acre, according to the quality; the farmer always undertaking to cultivate the land in a proper manner. The ſame practice, with a little variation, is alſo eſtabliſhed in ſome parts of England: The farmer rents or lets the land, to a perſon who is denominated a middle-man, or flax-jobber, and whoſe buſineſs it is, to perform all the various operations after the ſeed is ſown; which, as in the former caſe, is always furniſhed by the renter, the farmer having nothing more to do, than to plough and harrow the land.

On the principle, that it was politically right, by the uſe of every proper means, to prevent this nation from remaining in a dependant and precarious ſituation, in regard to a ſupply of hemp from foreign countries, the Britiſh Legiſlature deemed it proper, about thirty years ago, to offer conſiderable bounties on the importation of that

that article from the American colonies. Partly on the ſame principle, and with the view of eſtabliſhing and encouraging manufactures, what may be called domeſtic bounties have been for ſome time given, as an inducement to increaſe the cultivation both of hemp and flax. To theſe bounties or premiums being ſtill given, it is no doubt owing, that the culture of flax is ſo greatly increaſed in Scotland, and that hemp and flax are cultivated on ſo large a ſcale in ſeveral counties in England.

In certain ſituations, and under particular circumſtances, it will be readily admitted as being highly proper, to hold out bounties for the cultivation of articles, the manufacture of which, may uſefully and profitably employ a great number of people: At the ſame time, it may be contended, that circumſtances may ſo much alter, as to render it equally proper to withdraw theſe premiums, by which the cultivation of them had been generally eſtabliſhed.

When a country is thinly inhabited, ſo that the lands in tillage are more than ſufficient for producing an abundant ſupply of corn; when manufactures are ſo much in their infancy, that the foſtering hand of Government can alone extend or eſtabliſh them; and when the great body of the peaſantry are but partially employed; it muſt at all times, in ſuch caſes, be conſidered found policy in the Legiſlature, and alſo in private ſocie-

ties to hold out ſuch inducements as are moſt likely to effect an object ſo great, and ſo important, as the advancement of manufactures, and eſpecially of thoſe by which the raw materials produced in the country are converted into articles uſeful for domeſtic purpoſes, or valuable as articles of commerce. If full employment can be obtained for the labouring part of the community by means of the cultivation and manufacture of hemp and flax, without which foreign commerce cannot be extended, it is obvious that theſe, and ſuch as theſe, merit the firſt regard; and that the Government of a country, in the ſtate above deſcribed, could not poſſibly turn its attention to the eſtabliſhment of meaſures better calculated to promote the public good. But, in Great Britain, in its preſent ſtate, when its commerce and manufactures have arrived at an unexampled ſtate of proſperity, and far outrun its agricultural improvements; when the people at large (thoſe only in the more remote parts of the iſland excepted) are fully employed; when the population is ſo much increaſed, that we are told from the higheſt authority, that the inhabitants of this country are now reduced to the neceſſity of depending *for their very exiſtence* on ſuch precarious ſupplies of the moſt indiſpenſable of all the neceſſaries of life "bread-corn," as can be *annually* procured from foreign nations; in a word, when, if other nations were to refuſe

us

us ſupplies of grain, (notwithſtanding our boaſted improvements in agriculture), numbers of the inhabitants would literally ſtarve for want of food,—certainly the propriety of holding out bounties to thoſe who divert the land from the moſt uſeful of all purpoſes, that of raiſing grain, at once diſappears, and the practice, in place of being longer laudable or praiſeworthy, becomes to the higheſt degree improper.

If the ſubject be conſidered with a view to the manufactures of the country only, and although to promote theſe, not to advance the agriculture of the country, theſe bounties were firſt held out, yet the policy of continuing to adopt the ſame meaſure under the change of circumſtances that has taken place, is equally queſtionable. By what rule, it may be aſked, can the rate of labour be accurately determined? not ſurely by the value of money; for, of all articles, that is the moſt fluctuating. The quantity of proviſions which a labourer can purchaſe for his labour, is alone the true criterion by which to judge of the rate of labour. Taking this for granted, it follows of courſe, that to ſuch an extent as the Government of any country, (where the lands in tillage are found from experience inadequate to ſupply the inhabitants with bread), continue to bribe the farmers to cultivate hemp and flax in place of grain, to the ſame extent they injure the manufactures; as wherever an annual importation of grain

grain is requiſite, there the price muſt be higher than if a ſufficiency were cultivated in the country for the uſe of the inhabitants, and as the difficulty of procuring food increaſes, ſo will the price of labour, and ſo far muſt the manufacturer be injured.

CHAP.

CHAPTER XIX.

Orchards, and the Method of making Cyder and Perry.

ALTHOUGH numerous, and in many places extenſive and valuable, orchards, are to be ſeen in various parts of both kingdoms, yet the planting of apple and pear trees for the purpoſe of extracting liquor from the fruit, is confined to a few counties in the ſouth and weſt of England. In the counties of Hereford, Worceſter, Glouceſter, Monmouth, Devon and Dorſet, the greateſt quantity of cyder and perry is made, and of theſe Hereford is entitled to rank firſt, both in reſpect of the extent of the quantity manufactured, and of its generally ſuperior quality.

The aſpect moſt commonly choſen for an orchard, where no circumſtance interferes that renders it proper to prefer another, is towards the ſouth, or ſouth-eaſt; and wherever this can be procured, with, at the ſame time, the further advantage of poſſeſſing a ſcreen or ſhelter from the

the north and north-eaſt winds, the ſituation is conſidered to the higheſt degree favourable. Orchards are formed, or which is the ſame thing, fruit-trees planted, on ſeveral ſorts of ſoils; and which, if a remark, often made in the cyder diſtricts, be well founded, namely, that different ſoils produce fruit different in quality and flavour, is a method highly proper, as the greater variety there is in the taſte and flavour of the fruit, the more the cyder farmers have it in their power to make liquor of ſuperior quality. Apple-trees are for the moſt part planted either on ſtrong deep loams, or on ſuch clays as by having a portion of gravel in their compoſition are not retentive of water. Pear-trees are found to thrive beſt on ſoils of a lighter nature, and are planted on almoſt every ſort of ſoil where the under-ſtratum is dry, and ſo free as to admit the roots to ſpread out and penetrate to a proper depth.

It would be endleſs to enumerate all the various ſorts of apples and pears common in theſe diſtricts. Of the apples, the following are in the greateſt eſteem:

The Stire.
The Golden Pippen.
The Hagloe Crab.
The Woodcock.
The Old Redſtreak,
and
The Cockagee.

The

The pears that are conſidered the moſt valuable, as producing ſome of them the ſtrongeſt, and others the higheſt flavoured perry, are,

The Squaſh.
The Barland.
The Sack.
The Huffcap.
The Old Field,
and
The Red Pear.

Many of the orchard-trees in the cyder counties have been grafted on crab-ſtocks, in the manner uſually practiſed in the other parts of Great Britain; but the more general practice is to graft on ſtocks raiſed from kernel fruits. In the mode of ſowing the ſeeds, and managing the ſeedlings, nothing occurs worthy of particular remark. The nurſery-man's attention is chiefly devoted to procure ſtrong, vigorous, handſome, plants, and to train them as ſtraight and upright as poſſible.

In regard to the diſtance at which the ſtocks are planted from each other, it is neceſſary to obſerve, that in all the fruit diſtricts in England, there are what may be called two ſorts of orchards: the one, and to which that term more properly belongs, is an allotment of ground ſet apart principally for the growth of fruit trees,

and, as in Scotland, they are planted ſo cloſe to each other as to leave no more room than is ſufficient for allowing them to attain a proper ſize, without encumbering each other, or preventing a free circulation of air: The other may more properly be denominated a fruit field, as the trees are planted at ſuch diſtances as not, in any material degree, to obſtruct the tillage, or, but by the falling of the leaves in autumn, to injure the paſture. In the orchards, properly ſo called, from thirty to forty trees are commonly planted on the acre. In the fields, ſeldom more than ten or fifteen *.

The ſtocks are planted out into the orchard, or field, when eight or nine years old, by which time they generally meaſure four or five inches in circumference, at three or four feet from the ground. The ordinary ſeaſons of planting are the latter end of October and the beginning of March; the one or other being made choice of as beſt ſuits the nature of the ſoil, and the convenience of the farmer, but is probably more generally regulated by what is the eſtabliſhed cuſtom of the particular diſtrict, which, in matters of this kind, has generally a great effect on the conduct of individuals.

When

* Some farmers in Herefordſhire poſſeſs fruit fields of thirty or forty acres, and, in favourable ſeaſons, make four or five hundred hogſheads, containing a hundred and ten gallons each, of cyder and perry.

When trees, or what are called ſtocks, are planted out, eſpecially in a field that is kept either occaſionally or for the moſt part in tillage, it is uſual to place them in regular rows, ſo as not to impede the ploughing, or endanger the trees by carrying on the other neceſſary operations. After the ſtocks have been two or three years planted in the field, and have acquired a firm hold of the ground, they are grafted. There are various ways of performing this operation: That which is moſt common, is, to ſaw off the head of the ſtock, and, after making two or three tranſverſe cuts, or openings, in the top of the ſtock, the grafts are inſerted, and thereafter ſecured with a paſte made of clay, or other ſoil of a tenacious nature.

Although it is by no means a common practice, with thoſe who poſſeſs extenſive orchards, or fruit fields, to pay much attention to the training or proper management of trees, from the time they are grafted, till they arrive at ſuch an age as to bear fruit, which is in about five or ſix years, yet there are numerous inſtances where the contrary is the caſe. Many farmers are careful to train the trunk in an upright poſition, to take off all the decayed and uſeleſs wood, and to protect them by proper rails, and by other means, from being injured by cattle.

It was mentioned, when deſcribing the manner in which the lands of Great Britain are occupied, that the ſoil of the orchards was ſometimes

times in tillage, and ſometimes in paſturage. The mode of managing the orchard-fields does not vary in any material degree from that adopted in the other parts of the diſtrict where no trees are planted. In ſome places the ground is allowed to remain conſtantly in paſturage; in others it is as conſtantly kept in tillage; while in others, again, it is occupied in the production of alternate crops of grain and graſs: the prevailing practice in the diſtrict, more than any other circumſtance, regulating, in general, the mode of occupation. In the cloſe-planted orchards, whether in England or Scotland, the land is almoſt, in every inſtance, allowed to remain in graſs.

In all the cyder counties, there are three ſorts of fruit-liquor uſually made; as, cyder from apples, perry from pears, and another ſort, called cyder alſo, from a mixture of apples and pears. The method of making cyder and perry is ſo exactly ſimilar, except in ſome of the concluding proceſſes, as that of fermentation, racking, &c. that one deſcription is ſufficient.

It rarely happens, unleſs when the former year's ſtock of cyder is expended, (for in the fruit diſtricts cyder is the common beverage of the working people), that the farmers begin to gather the fruit till they have unqueſtionable proof that part of it at leaſt is ripe, by its beginning to fall ſpontaneouſly from the trees. When that happens, the general fruit-harveſt commences; and al-

though there are different modes of gathering the fruit, the moſt common is, to employ men with long poles to ſhake and beat off the fruit from the trees, while women attend with baſkets to gather, and put it into carts to be carried home. Another, and a better, method, both for the fruit and the trees, is to take at firſt ſuch of the fruit only as has either fallen ſpontaneouſly, or that can be forced from the tree by gently ſhaking it. The remainder is then allowed to remain till it arrives at a greater degree of maturity, by which means the loſs and inconvenience ariſing from mixing fruit in different ſtages of ripeneſs is prevented, and leſs injury is done to the tree.

After the fruit is brought home, it is laid in large heaps, ſometimes in the open air, and ſometimes in ſheds erected for the purpoſe. It is allowed to remain in theſe heaps in order to mature and become mellow, before it is put into the mill; and which is rendered the more neceſſary, in conſequence of the common practice of mixing the ripe and unripe fruit together. It is, however, attended with one diſadvantage, as it often happens, that the ripeſt and beſt of the fruit begins to rot, before the heap at large has acquired that mellowneſs which it ought to poſſeſs before the operation of grinding commences. A few farmers, more judicious than the others, ſort the fruit as it is gathered, according to the different

different degrees of ripeneſs, making ſometimes three or four diviſions. Others, again, keep the different ſorts of apples in ſeparate heaps, and only mix ſuch ſorts, and thoſe in ſuch proportions, as they know, from experience, will anſwer beſt. It is evident, that liquor made from fruit ſo managed, muſt be greatly ſuperior in flavour, colour, and quality, to that made from fruit managed in the manner firſt deſcribed.

After the fruit is laid in heaps, it is allowed to remain in that ſtate a ſhorter or longer period, according to the ſeaſon, and to the ſtate of the weather; but the general practice is, not to begin grinding till the ſeeds, on ſome of the fruit being cut through, appear black, or of a dark brown colour, or till ſome of the ripeſt is beginning to rot.

When the fruit is arrived at what is conſidered a proper condition for grinding, it is carried to the mill, without any farther precaution being in general uſed, than taking out any of the fruit that is completely rotten.

The common cyder-mill is conſtructed on ſimilar principles with thoſe erected for breaking bark, or bruiſing whins. The millſtone, or runner, about three or four feet in diameter, and from a ton and a half to two tons weight, is moved by an axle, paſſing through the centre, and extending over the bed of the mill, for a horſe to draw by. The other end of the axle enters an upright

upright ſhaft, or poſt, which has a circular motion, by means of pivots, the one fixed in a beam or rafter of the mill-loft above, and the other in the centre or bed of the mill below. The trough or chaſe, in which the millſtone moves, is made of ſtone, about ten inches deep, and the ſame breadth at bottom; the ſtones, which form the ſide next the centre of the mill, are placed perpendicularly, and made to anſwer exactly the circular courſe of the millſtone. The outſide ſtones are placed ſlopwiſe, ſo that the trough is ſeven or eight inches wider on the outſide of the millſtone at the top than at the bottom. This gives room to feed it in occaſionally under the millſtone, when grinding, and to take out the ground fruit, provincially called the "muſt."

The method of grinding is, to put from three to five buſhels of fruit into the trough or chaſe at once, and to keep the mill conſtantly going till the whole including rinds and kernels, be reduced to a ſoft pulpy ſubſtance. The more completely this is effected, the better is the liquor; the colour, taſte, and flavour, being all greatly improved, when, by properly grinding the fruit, the eſſence of the rinds and kernels is extracted, as well as the juice of what the cyder-farmers and gardeners call the "fleſhy" part of the fruit.

The operation of grinding is not very tedious, except when more than ordinary trouble is beſtowed,

ſtowed, it being common to grind from fifteen to twenty mill-fulls in a day. When the mills are of the middle ſize, three hogſheads of perry, or two of cyder, are uſually made in the day; and when a farmer, as often happens, has three or four hundred hogſheads to make in a ſeaſon, the work is carried on with ſtill greater expedition; but then it is not performed in the moſt approved manner, little more being done than grinding or bruiſing the fleſhy part of the fruit, without reducing the rinds or kernels to a proper ſtate for extracting their qualities.

When the fruit is ſo completely ground as to be reduced to a kind of pap, it is taken out of the trough; and, for the moſt part, put into a large vat, placed near the mill for the purpoſe, where it is allowed to remain for a day or two, or till ſome ſigns of fermentation be obſervable. When, by theſe ſigns, it is known to be ready for preſſing, that operation is performed in the following manner: A frame of wood, about three feet ſquare, and three or four inches deep, being placed on the bed of the preſs*, a piece of hair-cloth is ſpread over it, and part of the "muſt," in ſome places called the "cheeſe," being taken out of the vat, is put within the cloth in the frame; when the frame is carefully and evenly filled

* The cyder-preſs is worked by a ſcrew and nut; and is in every reſpect ſimilar in principle to thoſe uſed at oil-mills, and by packers, preſſers, bookbinders, &c.

filled with muſt, the edges of the haircloth are folded neatly over it; the frame is then raiſed up till the under-edges are equal to the top of the firſt-formed layer; and another haircloth being laid over the frame, it is filled in the like manner; and the work thus proceeds, till the pile riſes to the height of thirty inches or three feet.

Over the pile, when finiſhed, is laid a ſquare frame of ſtrong boards, on which are placed ſome blocks of wood, for the purpoſe of raiſing the pile as high as the croſs bar of the preſs. The power of the preſs is then applied; and the liquor being leiſurely expreſſed, runs from the bottom of the preſs into a reſervoir, placed at a little diſtance, to receive it. The preſſure is increaſed in proportion as the liquor is extracted; and at laſt the refuſe becomes ſo hard and arid, as to be incapable of yielding any more. It is then taken out of the preſs; and in years of plenty, thrown to the dunghill; but when ſcarcity prevails, it is ground and preſſed a ſecond time, being previouſly mixed with water, or with the firſt runnings from the preſs, which generally come off thick and muddy.

Cyder and perry, like all other vinous liquors, undergo fermentation; and greater ſkill and attention are requiſite to conduct them properly through this proceſs, by which chiefly their im-

purities are thrown off, than in any other branch of the buſineſs of cyder-making.

The liquor is ſometimes allowed to ſtand in large open vats, till it has done fermenting; but more generally it is put into large caſks and hogſheads directly from the preſs.

In reſpect to the commencement, continuance, and degree of fermentation, which theſe liquors paſs through, nothing is more uncertain. No artificial means being uſed to bring on fermentation, the period of its commencement muſt depend on various circumſtances; as, the ſtate of the weather, the ripeneſs and maturity of the fruit whence the liquor had been extracted, the ſize of the caſk and the quantity of liquor, whether in an open vat or tunned up in hogſheads, *&c.* On theſe depend alſo the continuance and degree of fermentation. In general, it commences the firſt, ſecond, or third day, and continues for two or three, frequently for four or five, according to the degree of fermentation which is excited. If the liquor be agitated, by being carried from one place to another at a conſiderable diſtance, the degree of fermentation that ſucceeds is more violent, and ſooner over than when liquor of the ſame quality is allowed to remain undiſturbed in the place where it is put when carried from the preſs.

At

At a certain ſtage of the fermentation, the liquor is racked off into other caſks. When this operation ſhould be performed, ſo that the greateſt poſſible advantage may be derived, is a point hitherto undetermined. Every perſon, acquainted with the art of cyder-making, agrees, that there is a critical period at which the liquor ſhould be racked; but in practice, the ſigns attended to as indications of the approach of that period, are as various as can be ſuppoſed. The uſual method, however, is to begin racking cyder, when the froth or ſcum which had riſen to the top during the fermentation and agitation of the liquor, has formed into a firm browniſh kind of cruſt. Perry is commonly racked, before the fermentation ſubſides ſo much that the liquor leaves off making a hiſſing noiſe, which it always does in proportion to the violence of the fermentation.

Owing to the various ſorts and qualities of liquors made *; to the different degrees of ripeneſs to which the fruit is allowed to arrive; and to the mixture of fruit of different or oppoſite qualities; it would be difficult, perhaps impoſſible, to lay down ſpecific rules to direct the cyder-maker, in regard to the beſt mode of conducting

* There are three ſorts of theſe liquors very commonly made; they are diſtinguiſhed by the names of the rough, the ſweet, and the rich or generous.

ducting the proceſs of fermentation, or to point out the particular period, when, from the extent to which the fermentation has proceeded, it is time, in every particular caſe, to endeavour to put a ſtop to it, by racking the liquor into another veſſel. It, however, ſeems generally agreed, that the proper time for racking either cyder or perry is between the period when the thickneſs or foulneſs, cauſed by the fermentation, ſubſides, and that of the falling of the froth or brown cruſt from the top; by that time, the liquor has acquired a greater degree of fineneſs than it can poſſeſs at any after period, while it remains in the firſt caſk, as all the ſettlings have attached themſelves, either to the top or the bottom of the veſſel.

Racking is nothing more than drawing off the clear liquor from one caſk, and putting it into another properly ſeaſoned, and is done by tapping the caſk pretty high, ſo that the clear liquor may be drawn off without any mixture of lees or ſettlings.

The liquor, with which the ſcum that was on the top, and the ſtuff that had ſettled at the bottom, is mixed, is then drawn off, and drained through a bag or cloth, and afterwards mixed in the new caſk with that which had run off fine, and to which it is ſaid to be ſuperior in colour, and in another peculiar property, namely, in poſſeſſing a power of preventing, or at leaſt

leaſt of leſſening, the extent of further fermentation; a circumſtance which frequently takes place, after all the attention that can be beſtowed to prevent it.

When the liquor is racked, if no after fermentations render other rackings neceſſary; or if a failure in the ſtrength, colour, or flavour, require not ſome extraordinary treatment; the proceſs of cyder-making, ſo far as the farmer is concerned, may be ſaid to be completed, as nothing more is neceſſary than to bung up the caſks, which is never done ſooner than two or three months after the liquor is for the laſt time racked off.

The quantity of cyder and perry made for ſale in the fruit diſtricts, is very great; but that uſed by the inhabitants, is by all accounts much more conſiderable.

Theſe liquors are ſold by the farmers in different ſtates of preparation for market. Sometimes they are ſold immediately from the preſs; ſometimes after the firſt racking; and frequently, not till ready for uſe.

The price of cyder and perry always advances, according as theſe liquors are in a prepared ſtate for the conſumer's uſe, as well as according to the quantity on hand, and the quality of the fruit whence it was made.

Stire cyder, and ſquaſh-pear perry, for inſtance, always give much higher prices than what

what is made from any other ſorts of fruit. The price of common cyder liquor, from the preſs, for a courſe of ſeven years, may be rated at from 15 s. to 30 s. the hogſhead of 110 gallons; and common perry, from 12 s. to 15 s. Stire cyder, in the ſame ſtate, ſells for L. 5, L. 10, and ſometimes L. 15 the hogſhead; and ſquaſh-pear perry, in ordinary ſeaſons, from L. 4 to L. 8.

The produce of cyder or perry, by the acre, can only be gueſſed at, by firſt aſcertaining the number of trees. From an orchard of trees, in full bearing, half a hogſhead of cyder may, in ſeaſons ordinarily favourable, be expected from the fruit of each tree. As the number of trees on the acre varies from ten to forty, the quantity of cyder muſt vary in the ſame proportion, that is, from five to twenty hogſheads. Pear-trees, in equal good bearing, yield fully one-third more liquor; therefore, although the liquor extracted from pears, ſells at a lower price than that produced from apples, yet the value by the acre, when the number of trees is the ſame, is nearly on a par.

Notwithſtanding there are many individuals in the cyder-diſtricts, who evince much care and attention in the management of their orchard-grounds, trees, fruit, liquor, &c. yet this is by no means the common caſe; on the contrary, ſuch general negligence prevails, and ſo imperfect are the modes in which this branch of huſ-

bandry

bandry is for the moſt part conducted, that many are of opinion, ſo much valuable land being occupied as orchards, is, in a national view, extremely unprofitable; and that, owing to the ſame cauſes, want of attention, and adopting improper modes of management, the farmers at large are alſo injured, rather than benefited. While orchards continue to be conſidered as ſecondary objects only, of the farmer's attention, as is the caſe at preſent, it can hardly be expected, that the produce will be abundant, or the quality ſuch as to recommend it to more general notice. In place, however, of condemning orchard-huſbandry at large, it appears much more correct to recommend a general reform in the management; whereby liquors, that are both wholeſome and agreeable, when well made, may be introduced into more general uſe, and ſo large an importation of foreign vinous liquors rendered unneceſſary.

In place of planting only ten or a dozen of trees on the acre over an extenſive tract of land, it would be more for the intereſt, and certainly much more convenient, for the cyder-men, were they to allot a few acres, adjoining to their places of reſidence, for the ſole purpoſe of growing fruit-trees. The loſs and inconvenience of having fruit-trees ſcattered over an arable field, are conſiderable. When the trees are full grown, they overſhadow, and conſequently greatly injure,

jure, the crop below; the roots alſo ſpread to a great diſtance; and beſides impeding the ploughing of the ground, extract a great ſhare of the nouriſhment that would otherwiſe go to ſupport the crop of corn. The additional expence in gathering and carrying home a crop of fruit from an extenſive fruit-ground, beyond what is incurred, when four trees ſtand on the ſame ſpace of ground, which, in the other caſe, is occupied by one, alſo merits attention.

Inconveniences, as great and numerous, reſult from having fruit-trees thinly ſcattered over a paſture-field. The graſs, under ſhadow of the trees, is very inferior to that in the open part of the field. The cattle muſt be excluded, when the fruit begins to ripen, eſpecially during and immediately after high winds, otherwiſe they would eat the fruit. The falling of the leaves in autumn is very deſtructive to paſtures of all deſcriptions; and the ſame additional expence and trouble of gathering and carrying home the crop, is alſo incurred.

For theſe reaſons, a cloſe-planted orchard muſt be preferable to orchard-fields: and where the ſoil and ſituation are proper; the grounds ſtocked with full-bearing trees of the beſt ſorts; and when the trees, the fruit, and the liquor, are judiciouſly managed; it is impoſſible, but, according to the produce and prices above ſtated, ſuch orchards muſt turn out profitable, even ſuppoſing

poſing they produce but one crop, equal to that above mentioned, every third year. On the other hand, if the ſlovenly manner of conducting the various operations of cyder-making be perſiſted in, it would be in favour of the nation, and of the individuals concerned in that branch of huſbandry, that there were not a cyder-orchard in the iſland. Perhaps, on another account, alſo, it might be for the intereſt of the farmers in the fruit diſtricts, that orchards were aboliſhed. The quantity of cyder annually uſed by the ſervants and labourers, is ſo immenſe, that, conſidering the injury which the crops of grain and graſs ſuſtain from the lands being encumbered with trees, the labour of collecting and carting home the fruit, and the trouble attending the manufacturing it into liquors; this beverage muſt be a more ſerious article of expence than the generality of cyder-farmers are diſpoſed to allow.

CHAPTER XX.

On Fallowing, and ſome Obſervations on Dibbling Wheat and Beans; and on Drill-Huſbandry.

HAVING, in ſome of the preceding Chapters, deſcribed, at conſiderable length, the uſual methods adopted for the cultivation and management of the various crops, it may be proper, in concluding the ſubject, to take notice of a few practices, which, although generally adopted in particular diſtricts, are in others little attended to. Some of theſe, eſpecially dibbling, or ſetting wheat and beans by the hand, being ſubjects, rather curious, than ſuch as are likely to become intereſting to the Britiſh farmers at large, ſhall, on that account, be ſtated as ſhortly as poſſible.

Section I. On Fallowing.

II. On Dibbling Wheat and Beans.

III. Some Obſervations on Drill-huſbandry.

SEC.

SECTION I.

On Fallowing.

The practice of fallowing, or of ploughing land repeatedly, during autumn, ſpring, and ſummer, with a view of extirpating weeds, and of preparing the ſoil for yielding more abundant crops, is very ancient.

It was unqueſtionably introduced into this iſland, ſoon after the Romans gained an eſtabliſhment in it. From the aſtoniſhingly great and arduous undertakings, in which it is well known that people engaged, in order to improve the country, may be inferred the attention beſtowed by them to introduce the beſt modes of huſbandry then known. As fallowing was a practice generally adopted in the country whence that people emigrated, it would naturally be conſidered by them as one fore mean of preparing the Britiſh ſoil for the production of grain.

That the Romans devoted much of their attention, while in this country, to the cultivation of the lands, and that agriculture greatly flouriſhed during their reſidence, we have the moſt inconteſtable evidence, in the large quanti-

ties

ties of grain they were able occaſionally to export to the Continent. But it is not neceſſary to have recourſe to the hiſtory of ancient times, for probable reaſons, to ſupport the opinion, that the practice of fallowing was introduced into Britain by the Romans. Almoſt every perſon knows, that the modes of cropping in the open-field pariſhes in England, which have remained for many centuries invariably the ſame, and which include fallow every third or fourth year, are exactly ſimilar to thoſe which were adopted by the Romans, and from which there has been leſs deviation in theſe pariſhes, owing to particular regulations that were early eſtabliſhed, than in any other part of Europe.

One great purpoſe of fallowing is to deſtroy the weeds, which, in conſequence of previous miſmanagement, and of over-cropping, have increaſed to ſuch a degree as to render cultivation for grain no longer profitable. Land, being allowed to reſt for a ſeaſon from yielding a crop, and being repeatedly ploughed, the ſoil expoſed to the influence of the different ſeaſons, and at the ſame time completely pulverized, its fertility is again ſomewhat reſtored, ſo that, by the application of a ſmaller portion of manure than would be otherwiſe neceſſary, it is rendered fit for again producing valuable crops of grain or graſs.

It is univerſally acknowledged, that all ſoils, even thoſe naturally the moſt fertile, are capable of being rendered unproductive by conſtant and ſevere cropping, and that the more improper the modes of cropping are, the ſooner, and the more certainly, will a comparative barrenneſs enſue. Hence the propriety of fallowing, where imperfect modes of culture are adopted. Fallowing in what may be called the infancy of improvements in agriculture, is alſo eſſentially neceſſary. If land be greatly exhauſted, no matter by what ſort of previous miſmanagement, fallowing is the moſt expeditious, the moſt effectual, and, every thing conſidered, the leaſt expenſive, method that can be adopted, for reſtoring its fertility, and rendering it productive.

It is the moſt expeditious; becauſe it is completely done in the courſe of one ſeaſon; whereas ſeveral years of culture, and a great additional quantity of manure, would be requiſite, were any other leſs effectual mode of tillage adopted.

It is the moſt effectual; becauſe the farmer has it in his power to deſtroy every weed, to turn over and expoſe the ſoil to the influence of the weather in the different ſeaſons, and alſo to level and ſtraight the ridges, drain the land, and remove every obſtruction to the introduction of better modes of huſbandry, none of which could be ſo conveniently or effectually performed be-

tween

twech the harveſt of one year and the ſeed-time of the next.

Fallowing is alſo, upon the whole, the leaſt expenſive method by which the fertility of land, greatly exhauſted, can be reſtored, and the only one that can be adopted with a certainty of ſucceſs, for the removal of every obſtacle to the introduction of more perfect agriculture. Manure, operates more powerfully when applied to a field that has been properly ſummer-fallowed, than when laid on one that has been long under an improper courſe of cropping. The returns, after fallowing, will be to a certainty greater, and, therefore, although the actual expence of fallowing is conſiderable, yet the crop that ſucceeds is ſo much greater as to counterbalance that expence, while thoſe that follow, if properly adapted to the ſoil, will yield the farmer a proper compenſation for his extra trouble and expence.

In the above ſtatement, the writer had chiefly in his eye the practice of fallowing, as recently adopted in the ſouthern parts of Scotland; and the principles on which the farmers regulated their conduct, when new and better modes of culture became general.

Some writers on huſbandry have recommended fallowing in every ſituation, and in the ſtrongeſt manner, while others have reprobated the practice in terms as pointed; but without informing the reader of the circumſtances under which

which these different opinions were formed, so that he might be enabled to draw the proper inferences.

The practice of fallowing may no doubt be adopted with propriety in some cases, while a slavish adherence to it in every instance would be highly improper. The following statement respecting fallowing will, the writer presumes, be acknowledged, not only as well founded, but as applicable to the present state of husbandry in the different parts of Great Britain.

1st, Where improvements in agriculture have never been introduced, or generally established, fallowing, as a mean of renewing the fertility of worn-out lands, is little known, and seldom practised.

2dly, Where a spirit for agricultural improvement prevails, and where the great body of the farmers evince a disposition to adopt new and better modes of husbandry, the practice of fallowing always becomes general.

3dly, Where fallowing every third or fourth year is a common practice, and has been continued for ages, while, at the same time, the soil and situation are favourable for the cultivation of green crops,—there agriculture will be found to be in a languishing state, and that the interference of the Legislature is necessary, either to unloose the shackles in which it is bound, or to create a spirit of exertion and enterprise among the inhabitants.

4thly,

4thly, Where it has become common to explode fallowing, although formerly a practice generally adopted in a diſtrict, and to ſubſtitute green crops in its ſtead,—there it will be found, that the art of agriculture has advanced conſiderably on the road towards perfection.

From theſe poſitions, it may be concluded, that where no particular reſtrictions impede the courſe, the uſe or diſuſe of fallowing, marks the commencement, and the progreſs, of improvements in agriculture. Great Britain furniſhes evidence ſufficient to eſtabliſh the correctneſs of this ſtatement. Let us examine the preſent ſtate of huſbandry in different diſtricts of theſe kingdoms by this criterion, and the reſult will ſatisfy every perſon, that it is leſs liable to error than any other that can be adopted.

In the north and north-weſt parts of Scotland, and in ſome diſtricts in Wales, the practice of fallowing land can ſcarcely be ſaid to be introduced, at leaſt it is only followed by a few individuals.—There, of courſe, the ancient ſyſtem of one white-corn crop ſucceeding another remains completely eſtabliſhed, and the returns are both trifling, and of the moſt inferior quality; in ſo much that, in ordinary years, the inhabitants are obliged to have recourſe to importation, for the neceſſary ſupply of food. How long the farmers

farmers of theſe diſtricts may neglect the introduction of fallowing, which may be denominated the mean by which the door to agricultural improvements would be moſt effectually laid open, is extremely uncertain. The poverty and ignorance, and in too many caſes the ſlaviſh ſituation of the tenantry, added to the careleſs indifference which the proprietors in general evince, in regard to their own real intereſts, the ſituation of their people, or the improvement of their native country,—are obſtacles ſo difficult to remove, that it is much to be feared, the period is yet diſtant, when this firſt advance towards improvement will be generally made: But, till that be the caſe, the agriculture of theſe diſtricts muſt continue in a deſpicable ſtate.

The ſpirit for improvements in agriculture, which has ſpread with ſuch rapidity among the proprietors and farmers in the ſouthern parts of Scotland, became firſt diſcernible in the general introduction of the practice of fallowing. Conſidering the worn-out and exhauſted ſtate of the lands, and the inequality and irregularity in the ſize and ſhape of the ridges, which was everywhere conſpicuous when this diſpoſition for improvement evinced itſelf, no means could poſſibly have been adopted, which would have inſured ſo ſpeedily the attainment of the object in view, as fallowing. In the courſe of performing that operation, the ſurface of the fields was

made as level as poſſible, the large ſtones removed, water-courſes formed in the beſt directions, for carrying off the ſuperfluous water, and every other neceſſary meaſure adopted, whereby new and better modes of culture and of cropping might be introduced with the greateſt advantage. The ſucceſs has been much more than equal to the labour and expence conſequent on ſuch undertakings, and demonſtrates, in the clearеſt manner, that the principles on which the proprietors and farmers in that part of Scotland acted, were fundamentally right, and that they are ſuch as, if adopted, and acted upon in any other country, where improved modes of cultivation are unknown, will neceſſarily produce the ſame beneficial effects, namely, general and permanent improvement.

A complete alteration having been, generally ſpeaking, effected in the huſbandry of that part of Scotland under review, by the means above mentioned, many proprietors ſeem now diſpoſed to attain to ſtill greater perfection in the management of their eſtates, by excluding fallow, or at leaſt by what is nearly the ſame thing, *viz.* permitting their tenants occaſionally to ſow peaſe, beans, turnips, *&c.* in that portion of the farm, which, by the general eſtabliſhed order of cropping, ſhould be in fallow. This is however a degree of perfection in arranging the order of cropping, that is by no means general; on the contrary,

contrary, the practice of fallowing, at ſtated intervals, is too rigidly adhered to on a great number of the moſt valuable farms in Scotland, whereby an unneceſſary expence is incurred, without any ſubſtantial benefit being derived. It ſeems an abſurd rule, that to render a farm to the greateſt degree productive, it is neceſſary that one-fifth or one-ſixth of it ſhould be annually cut off from producing any return.

Whoever has viſited a few of the open-field pariſhes in England, will readily admit, that there agriculture ſtands much in need of reform. In theſe pariſhes, fallowing every third or fourth year, is a practice almoſt univerſally adopted, and has been generally eſtabliſhed for ages. It is not however, from a conviction of the correctneſs of this method of preparing the ſoil for producing abundant crops, that it is ſtill purſued; The ſenſible and intelligent farmers, many of whom poſſeſs lands in theſe pariſhes, are fully convinced, that to ſuperſede the neceſſity of repeated fallowings, by the introduction of horſe or horſe and hand hoed green crops, would be the moſt eſſential improvement that could be adopted. But the diſperſed ſituation of the lands occupied by every farmer, and the abſurd regulations, ſome of them eſtabliſhed perhaps a thouſand years ago, by which the conduct of the community at large, as well as of every individual, muſt be regulated, renders the introduction

tion of better modes of husbandry, if not impossible, at least extremely difficult. The man of activity and enterprise, is placed on a footing with the most indolent; and must remain so situated, till, by the intervention of the Legislature, he is enabled to act more agreeably to the impulse of his own mind.

Whether the Board of Agriculture will ultimately prove successful in procuring a general inclosure-bill, by which means only this great proportion of the best lands in England can be brought under proper cultivation, the writer pretends not to determine. From his knowledge of the importance of the object, and the advantages that would result from all the arable open-field lands in that kingdom being inclosed, he most sincerely wishes success to attend the measure. He is not, at the same time, very sanguine in his expectations: Numerous obstacles, he knows, and many of them of great magnitude, must be surmounted; and it may be found a task extremely arduous, to reconcile all the jarring interests that oppose themselves to the completion of a measure so complicated in its nature. If the perfection of agriculture consists in substituting, with advantage, green crops in place of fallow, as it certainly does, Norfolk is the district in Great Britain where that practice has become most general; and where, from many years experience, that mode of management

ment has been found favourable for the ſoil, and profitable to the farmer. The ſoil of Norfolk is in general indifferent; much of it light and ſandy in the extreme, yet it is everywhere in a high ſtate of cultivation; and the ſuperabundant produce more conſiderable than what is exported from any other diſtrict, equal in ſize and population.

By ſubſtituting turnips, or other green crops, in place of fallow, the Norfolk farmers have one obvious advantage over thoſe who adhere to the latter ſyſtem; namely, that of a large annual addition of valuable manure. This, together with the modes of cropping being extremely favourable, two white-corn crops never ſucceeding each other, accounts in a very ſatisfactory manner for the lands being in a proper ſtate of culture; and alſo for their producing, on an average of years, greater returns than thoſe of better quality in other parts of Great Britain, although fallowed every third, fourth, or fifth year. Upon the whole, it appears evident, for the reaſons already mentioned, that when it is propoſed to adopt new and better modes of huſbandry on a farm, that had been for a long time miſmanaged, the moſt certain method to be adopted, for rendering it moſt ſpeedily, and to the greateſt degree, productive, is, to begin with ſummer fallow. By this means, the farmer will have it in his power, in ordinary ſeaſons, to effect

fect all the objects which, in ſuch a caſe, naturally preſent themſelves to his view; but ſhould any unforeſeen circumſtance prevent him from doing ſo, he will ſtudy his own intereſt, by again repeating the fallow in the ordinary courſe, till he can bring his farm into that ſtate of culture, which he knows will ultimately turn out moſt profitable: Thereafter, proper attention in regard to cropping, a judicious choice of green crops, and general management, will preclude the neceſſity of his having again recourſe to fallow, except on extraordinary occaſions. On the occaſional failure of a crop, weeds generally grow with more than ordinary luxuriance. As theſe are the greateſt enemies to the farmer's proſperity, they ſhould be extirpated at all events; and an adherence to any general rule, however correct in principle, ſhould never induce him to allow them any quarter. If weeds have become ſo abundant, as to leave little chance of being able to deſtroy them by the ordinary methods of horſe and hand hoeing, recourſe ſhould be had to fallow, as the ſpeedieſt and moſt effectual method of curing the evil.

The uſual method of fallowing land was deſcribed, when treating of the culture of wheat. It may not be improper here to add ſome remarks made by a gentleman-farmer in Dorſetſhire, reſpecting fallowing *. They are new and important,

* Bath Society Papers, Vol. ii. page 270, &c.

important, and therefore merit attention; and ſeem equally applicable, whether it be propoſed to winter fallow for barley, or to winter and ſummer fallow, as a preparation for wheat.

When the land is ploughed after harveſt, which he recommends to be done as deep as poſſible, he ſays no time ſhould be loſt in rendering this new turned up ſoil as fine as harrowing can make it. He then adds, "I am convinced, "by repeated experiments, cloſe obſervation, "and plain reaſoning on known facts, that lands "that are made fine before the ſharp froſt "and winter rains come on, will receive a "much larger ſhare of their influence than "any other.

"If the land be left in a rough ſtate, there is "ſeldom time for the rains and froſt to affect "more than the outſide of the large clods or "lumps: The outſide will indeed be pulverized, "but the *middle* of the lumps, wherever they are "large, will be found nearly in the ſame hard "ſtiff ſtate, as when turned up by the plough. "Hence it muſt appear to every one, that the "benefit of air, winter rains, and froſts, on "lands thus left, is partial; and the conſe-"quence is, that harrowing it in the ſpring, "when theſe are over, is too late for its receiv-"ing the benefit which would have accrued "from

" from them, and the power of vegetation is not " ſo vigorous.

" But to make winter fallows as fine as they " can be in autumn, and then ridge them up in " that pulverized ſtate, is acting moſt agreeably " to nature. The greateſt poſſible quantity of " ſurface, is by this means expoſed to the atmo- " ſphere; and the land is left in a ſtate, where- " in the rains and the froſts are moſt eaſily ad- " miſſible. They will then penetrate and enrich " the whole maſs to a greater degree.

" If the froſt penetrates a quantity of earth, " formed into a large hard clod, *partially*, on " account of its bulk and hardneſs, (which is al- " ways found to be the caſe), it is evident, that " the ſame clod, broken into four parts, would " be thereby penetrated four times as much; " or, in other words, four times the quantity of " earth would be affected by it, and on a thaw " be pulverized. For we find, that after the " breaking up of a ſevere froſt, all the ſmall " clods crumble eaſily into powder; while the " large ones are only made ſmaller, by the " crumbling off of their ſurfaces to a certain " depth."

Such are the reaſons which this gentleman aſſigns for differing in the mode of managing his fallows, from the generally eſtabliſhed practice. They ought to have conſiderable weight with

with thoſe particularly, who cultivate ſoils of a ſtrong and adheſive nature; as the ſucceſs which attended the experiment he made, is a ſufficient inducement to others to follow his example. He mentions, that he left one half of a field of ten acres, as nearly of an equal quality as poſſible, in the rough ſtate after ploughing; and that he made the other very fine, by harrowing, and by beating in pieces any large hard clods, which the harrows would not break.

In the following ſpring, that part which had been harrowed was much finer, without any additional labour, than he could render the other by repeated harrowings. This he accounts for, by ſtating, that the rain and froſt not having penetrated the middle of the large clods, they had received no benefit therefrom; and were as hard as bricks, being only leſſened in ſize.

The whole field was ſown with barley, and nine pounds of broad clover immediately afterwards. On harveſting the crop, he kept that of the one half of the field ſeparate from the other. The part which had not been harrowed in autumn, produced twenty-four buſhels the acre; the other thirty-one, and the quality of the grain much ſuperior. The crop of clover the following year, was equally in favour of this new method of fallowing; being heavier, by

near half a ton the acre!—How much is it to be regretted, that proprietors and farmers do not more frequently make experiments, and record the refult! It would be a fund of fatisfaction to themſelves, and would tend ultimately to promote the public good.

If, from repeated experiments, it ſhall be found, that the trifling difference of harrowing a field in autumn in place of ſpring, produces uniformly ſuch additional returns as are above ſtated, it is a ſtrong evidence of how many uſeful, yet ſimple diſcoveries, remain to be made, in regard to the proper modes of conducting the operations of huſbandry.

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SECTION II.

On Dibbling Wheat, Beans, &c.

THE practice of dibbling, or ſetting wheat by the hand, was firſt introduced into Norfolk about twenty years ago, by a perſon who poſſeſſed a ſmall farm in the neighbourhood of Norwich. This practice, which gradually gained ground in that diſtrict, has now become pretty general in the adjoining counties of Cambridge and Suffolk. In both of theſe, as well as in the county of Norfolk, conſiderable quantities of wheat are annually ſet by hand; but in Norfolk, where this method was firſt adopted, the quantity of wheat now planted by hand is not nearly ſo conſiderable as it was a few years ago.

Wheat is generally dibbled in October, on land newly broken up from clover ley. When the ſoil is of a light nature, it is uſually rolled before the ſeed be planted; the method of doing which is as follows. A man, with an iron dibble, of about three feet long in each hand, walking backward, makes two rows of holes in each furrow, ſlice, or flag; theſe are made about four inches diſtant from each other, and from one to two inches deep. The dibbler is followed by

two or three women, boys, or girls, who drop two or three grains into each hole. The field is afterwards buſh-harrowed, by fixing thorns to a gate, and drawing it by one horſe along the furrows. The uſual quantity of ſeed is about ſix or ſeven pecks, and the expence of ſetting from nine to ten ſhillings the acre. An experienced dibbler, with three active attendants, will plant half an acre a day, making ſix holes in every foot length along the furrow.

The advocates for dibbling wheat ſtate ſeveral advantages which, in their opinion, reſult from adopting this method in preference of the ordinary one of ſowing broad-caſt. They ſay a conſiderable quantity of ſeed is ſaved: That the grain is better, more equal in quality, and the increaſe greater; and further, that by the general eſtabliſhment of this practice, the poor would find employment.

There is no doubt but a conſiderable ſaving muſt take place in the article of ſeed, when the grains are dropt at regular diſtances, in place of being ſcattered promiſcuouſly. The quantity is ſaid to be in general about a buſhel the acre. Were no other benefit derived from adopting this practice, than ſaving a buſhel of ſeed on the acre, that, at the ordinary price of wheat, is more than counterbalanced by the extra expence incurred. The farmer, in order to ſave this buſhel of wheat, value five or ſix ſhillings, muſt

muſt pay his labourers nine or ten. On this principle, therefore, the practice cannot be defended.

It is natural to ſuppoſe, and will be readily admitted, that a crop of planted wheat will always be to a certain degree better and more equal in quality; and (although, from that circumſtance, probably chiefly) greater in quantity than that ſown broadcaſt. The crop, ſpringing up at regular diſtances, enjoys, during the whole period of its growth, a more free circulation of air, and derives greater benefit from the rays of the ſun, than when, by ſowing the ſeed too thick, or irregularly, the plants ſtand ſo cloſe together, that both are in a great meaſure excluded. There is another reaſon why the grain ſhould be of a better quality. It was obſerved, that wheat is commonly dibbled on land broken up from one year's clover.

When wheat is ſown broadcaſt on ſuch lands, a great many of the ſeeds falls naturally into the interſtices of the furrows, where they are either choked, or retarded in their growth, by the weeds which ſpring up there in greater abundance than in the other parts of the field: Whereas, when the ſeeds are ſet in the ſlice or flag, the plants cannot interfere with any impediment to retard their growth. Although, for theſe reaſons, it is highly probable, that the produce of dibbled wheat muſt always be ſuperior

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in quality and quantity to that ſown broadcaſt; yet, without repeated experiments, or the eſtabliſhment of a law, whereby all grain ſhall be ſold by weight, it is impoſſible to determine the extent of that ſuperiority; or, whether ſo much advantage reſults therefrom, as to encourage farmers, in other parts of theſe kingdoms, if practicable, to adopt the ſame method.

Some people have gone ſo far, as to aſſert, that dibbling wheat is one of the greateſt improvements in modern agriculture; and that owing chiefly to the circumſtance of its furniſhing work for the poor. In a populous diſtrict, where agriculture is almoſt the only employment of the inhabitants; and where the poor-rates have advanced to an extravagant height, the introduction of any new practice, whereby the poor can be uſefully employed, while the individuals, who furniſh that employment, if they are not benefited, are not injured thereby, muſt be deemed a very eſſential improvement. Dibbling wheat, therefore, in diſtricts ſo ſituated, eſpecially if followed out by hand-hoeing, ſo as to afford ſtill longer work, may be a very proper way of furniſhing employment for the peaſantry. But in a country like Great Britain, where the great body of the people are alternately employed in warfare, or in commerce and manufactures, and the ordinary operations of huſbandry, the impracticability of rendering this a general practice,

tice, muſt be at once obvious. The population muſt indeed be amazingly increaſed before that can happen.

Populous as this iſland now is beyond what it was at any former period; yet, were a law enacted, that all grain ſhould be planted by hand, it would be neceſſary, that all ranks, the governors, as well as the governed, ſhould learn how to uſe the dibble. In a word, although the practice may be beneficial, as well as laudable, in ſome particular diſtricts, yet no perſon, in his ſober ſenſes, will think of recommending the general eſtabliſhment of it as an improvement in the national agriculture.

The practice of dibbling peaſe and beans, which is ſometimes done ſeparately, and ſometimes mixed together, is chiefly confined to Glouceſterſhire, and the operation for the moſt part performed by women. As ſoon as the land can be got properly harrowed, and the ſurface ſmoothed, in the ſpring, that is, between the beginning and middle of February, the work of ſetting commences: In ſome places, in rows acroſs; but more frequently along the ridges. Some ſetters uſe a line to direct them, in forming the rows at equal diſtances; others again, particularly thoſe who have been long uſed to the buſineſs, do not conſider a line as neceſſary. The ſetters begin each at the end of a row; and making holes at the diſtance of about two inches

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from each other, and about the ſame depth, depoſit one pea or bean in every hole; and thus proceed, till the work be completed. The diſtance between the rows is ſeldom leſs than ten; and, in few inſtances, more than fourteen inches. The quantity of ſeed neceſſary is from two and a half to three buſhels, according to the diſtance of the rows; and the price of ſetting from 3 s. 6 d. to 4 s. 6 d. the acre. When the ſetting of the field is completed, it is gently harrowed, in order to cover the ſeed, and the crop is repeatedly hand-hoed afterwards, as occaſion requires.

If the object which the Glouceſterſhire farmers have in view in adopting this practice, be to furniſh employment for the poor, the crops being always repeatedly hand-hoed by the perſons who were employed in putting the ſeed in the ground, is a ſtrong additional circumſtance in ſupport of the juſtneſs of the principles on which it was adopted, and of which thoſe who are in the habit of ſetting wheat, cannot avail themſelves. If an extraordinary number of people be not employed, theſe repeated hoeings muſt take up a conſiderable period; and will not, in ordinary caſes, be finiſhed before the commencement of hay-harveſt; which being again ſucceeded by the corn-harveſt, the induſtrious poor are thus furniſhed with almoſt uninterrupted employment in the fields for ſix or

ſeven

ſeven months. In diſtricts, where the poor, from long habits of idleneſs, have become numerous, profligate and uſeleſs, members of ſociety, this muſt be conſidered in every point of view advantageous: While, under other circumſtances, this method of managing bean-crops might be impracticable, from the rate of wages, and the people being fully employed in manufactures; or, if practicable, neither beneficial to the community nor to individuals.

Where theſe circumſtances occur, and they fortunately do ſo over the greateſt part of this iſland where improved agriculture is practiſed, drilling beans, or dropping them in the bottom of every ſecond or third furrow, and afterwards horſe-hoeing the crop, will be found a method not leſs favourable for the ſoil; and, if at all, but in a ſmall degree, leſs profitable to the farmer.

SECTION III.

Some Obſervations on Drill and Horſe-Hoeing Huſbandry.

THERE are few ſubjects connected with huſbandry, that have attracted the attention both of theoretical and practical farmers more than this. Some have ſaid too much in favour of drill-huſbandry in general; while others, from probably the failure of ſome ill-conſtructed experiments, have exerted their endeavours to impreſs on the public mind, the abſurdity of adhering to a ſyſtem which they have had ſo much reaſon to reject.

Drill-huſbandry may be defined, the ſowing of grain and other ſeeds with a machine, and in regular rows, in place of ſcattering them promiſcuouſly by the hand, by which means they are dropped at more equal diſtances, and lodged at more proper depths, than can be done in the ordinary way. Horſe-hoeing huſbandry, which is intimately connected with the former; and which for the moſt part forms part of the ſame ſyſtem, is nothing more than repeatedly ploughing the interſtices, while the crop is growing in the rows. The horſe-hoeing of crops is a practice that has

been long eſtabliſhed in Italy, and had its riſe not in any intention to improve, but to deſtroy the crop. The circumſtance is related by Pliny, who informs us, that a people whom he calls the *Salaſſi*, ravaged a country adjoining to the Alps. This depradation having been committed after the crops were ſown, theſe the invaders were anxious to deſtroy; and to effectuate their purpoſe, they ploughed in the growing corns. This operation, it would appear was, as might naturally be expected, performed in a hurry, and of courſe imperfectly, in ſo much, that the plants which remained, owing to this additional culture, became more than ordinarily luxuriant, and thereby the natives were induced to continue the ſame method of culture *.

Drill and horſe-hoeing huſbandry were firſt introduced into England by Jethro Tull, Eſq; of Sharbone, in the county of Berks, about the year

* The above is not the only inſtance where ravages and wars, have tended ultimately to the improvement of a country. The Roman invaſion was the means of introducing agriculture into Britain. The Norman conqueſt operated greatly towards its improvement. By Oliver Cromwell's over-running Scotland, white oats were firſt brought into that country. The cloſe of the rebellion of 1745, is the æra whence to date the commencement of agricultural improvements on the north ſide of the Tweed. Beſides theſe, other inſtances recorded in the hiſtory of theſe kingdoms might be mentioned.

year 1713, and are now well known by the name of Tull's husbandry.

The saving of seed, (for it will be universally admitted, that a quantity unnecessarily great is often sown), is no doubt an object that merits attention, and to effectuate which, drill machines are well calculated. That weeds should be destroyed, and the soil pulverized and exposed to the influence of the sun and air, must also be agreeable to the ideas of every good farmer. But although the principles of this new system of husbandry may be correct, and such as carry conviction along with them, yet some of the methods of practice may not so readily meet general approbation.

Drill husbandry may not improperly be ranged under the following heads:

I. Drilling wheat, barley or other white-corn crops, in distinct rows, at from three to five feet distance, with a view to horse-hoeing.

II. Drilling in rows of eight or ten inches distance, with intention to hand-hoeing.

III. Drilling in rows, of the same distance as last above mentioned, but only for the purpose of saving seed.

IV. Drilling

IV. Drilling and horſe-hoeing green crops, and thereby excluding the neceſſity of repeated fallowings.

Firſt, Drilling wheat, barley, or other white-corn crops, in diſtinct rows, from three to five feet aſunder, and with a view to horſe-hoeing, was the method firſt adopted by Mr Tull, and ſince followed by an individual or two in a few particular diſtricts. If after upwards of eighty years practice of this method of culture, ſo few converts have been made, at leaſt who adhered to it for any conſiderable time *, the preſumption is, that there is ſomething fundamentally wrong either in principle or practice. If the principle be admitted to be right, which it certainly is, then the error muſt be in the practice.

It ſeems only neceſſary to mention the diſtance at which Mr Tull, and his diſciples, conceived it neceſſary to drill the rows of wheat, without mentioning the additional circumſtance, that dung was ſeldom or never applied, to convince every

* The only inſtance where the writer has had occaſion to ſee wheat drilled for a courſe of years, at ſuch diſtance in the rows as above mentioned, was by Dr Walker near Elgin, in the county of Moray. If that gentleman has not derived much emolument from purſuing this method of culture, he may at leaſt enjoy the ſatisfaction of reflecting, that he has afforded much amuſement to the *old-faſhioned* farmers in the neighbourhood.

every intelligent perſon of the abſurdity of adopting this method.

It is by no means intended to enter on a hypothetical ſtatement of the comparative expence, or the ſuperior advantages reſulting from an adherence to this which is called the new, or to the other which is called the old huſbandry. Numbers of theſe have long ſince been laid before the public, but with little ſucceſs in regard to the more general introduction of the new ſyſtem, if we may judge from the ſmall number of converts that have been made. Theſe are, indeed, very inconſiderable, for it is probable there are not half a dozen real Tullians in the iſland. Scotland, the writer has reaſon to believe, can only boaſt of one. Perhaps in place of entering at great length into the merits of this long diſputed queſtion, which of the two ſyſtems is the beſt, it may be equally proper to put the matter in a new point of view, and allow the reader to draw his own concluſions. Suppoſe an agricultural writer were to come forward, and ſtate to the Britiſh farmers, That if they would fallow their lands for four years ſucceſſively, and ſow it with wheat the fifth, they would have as valuable a return in that year, as others would reap, who ſowed turnips, barley, clover, wheat in ſucceſſion; or who adopted any other judicious rotation, by which the land would befully occupied for the whole period.

Unfortunately

Unfortunately for Britiſh agriculture, Mr Tull placed too much faith in good culture, or more properly diſregarded the benefits which every farmer of the weakeſt underſtanding knows are derived from the uſe of manure. Had that not been the caſe, the practice of horſe-hoeing green crops, a practice which is now very generally adopted in many counties, and with never-failing ſucceſs, would have been introduced at a much earlier period, and the national huſbandry would ere now have arrived at a much greater degree of perfection.

Secondly, The drilling of white-corn crops in rows of eight or ten inches diſtance, with intention to hand-hoe, is a method practiſed by Mr Ducat of Eſher, in the county of Surry, (whom Mr Young ſtyles the "Prince of Farmers,)" on a larger ſcale than probably by any perſon in Great Britain. The arguments mentioned in the former ſection in favour of dibbling, are equally applicable here. There is a ſaving of ſeed. The grains are depoſited at the moſt proper depths, and numbers of poor people find employment. To theſe may be added, what cannot have eſcaped the obſervation of every farmer, who, like the writer, has ſurveyed Mr Ducat's fields, that they are in a high ſtate of culture, and the crops free from weeds. On the other hand, the extra expence to which Mr Ducat is neceſſarily ſubjected in the management of his farm, muſt be conſiderable:

able: Perhaps greater than any, or all the advantages that can poſſibly reſult from an adherence to this practice. But, as was formerly hinted, any generally eſtabliſhed mode of culture by which a great additional number of hands would be requiſite, cannot poſſibly be adopted in theſe kingdoms, while manufactures continue to increaſe. Mr Ducat, however, as an individual, deſerves praiſe; his labours in the agricultural line are not in vain, for every perſon who perambulates his farm, will return ſatisfied of two facts, namely, "that good culture, and attention to keeping the crops clean," are eſſentially neceſſary to the production of valuable crops.

Thirdly, Drilling in rows, of the ſame diſtance from each other as laſt above mentioned, but only for the purpoſe of ſaving ſeed, can only be attended with one other advantage beyond ſowing broad-caſt; that is, the certainty of depoſiting the ſeed at the moſt proper depth. Another, indeed, occurs, and is a neceſſary conſequence of adopting this practice. The land muſt be in a better ſtate of tilth, to allow the drill-machine to work ſteadily, than what is always deemed neceſſary when a field is ſown broad-caſt.

This method of depoſiting the ſeed, is common in ſeveral of the Engliſh counties; but, whether the ſaving of the ſeed, and the ſuperiority

ority of the crops, in conſequence of the additional cultivation, are ſufficient, or more than ſufficient, to counterbalance the extra charge for ploughing, harrowing, and drilling, the writer has not had ſufficient opportunities of procuring information, ſo as to enable him to draw accurate concluſions.

By much the greateſt quantity of grain ſown with drill-machines in England *, is ſown with a view to horſe-hoeing. The drill (Cook's for inſtance) which ſows ſix or eight rows at a time, can with the greateſt eaſe be converted into a hoe, or rather into as many hoes as there are interſtices between the rows that are ſown at one time. By this means, the lands may be cultivated at a trifling expence, while the crop is growing, which cannot be done in the broad-caſt huſbandry, unleſs in the manner practiſed in Glouceſterſhire, that is, by hand-hoeing. Several of theſe machines ſow or hoe, ſeven or eight rows at once; ſo that one or other of the operations may be performed over eight or ten acres in the courſe of a day. It muſt be agreeable to the ſentiments of every perſon in the leaſt degree acquainted with the ſubject, that to break the cruſt that forms, eſpecially on ſoils of a

 tenacious

* Drill-machines are never uſed in Scotland, the inſtance above-mentioned only excepted, unleſs for ſowing beans, or turnip-ſeed.

tenacious nature during winter, muſt give great relief to the young tender plants of wheat in the ſpring; and on that account, hoeing muſt be advantageous; but it is worthy of remark, that hoeing a crop of wheat in the ſpring, may tend materially to accelerate or retard its growth, according to the ſtate of the crop at the particular period when the hoeing is performed. If the hoeing be performed when the crop begins to tiller, it will encourage its doing ſo to a greater degree, than if the ſoil had not been moved, and conſequently retard the growth of the plants. Whereas, if the hoeing be delayed till the tillering is over, it gives new vigour to the plants, at a ſeaſon of the year, when, without ſuch a ſtimulus, they would ſpring up only by ſlow degrees. This is a remark, which thoſe who adopt this method of cultivating wheat, will probably find worthy of attention. In regard to ſpring-corn, the only uſe of hoeing can be to deſtroy weeds. That being the caſe, the writer begs leave to ſurmiſe, that when lands are cultivated in a proper manner for receiving the ſeed, this additional culture muſt be in a great meaſure, if not altogether, unneceſſary. On the whole, although the hoeing of wheat, when performed at the proper period, muſt, for the reaſon above mentioned, be advantageous; yet it does not appear ſo evident, that the hoeing of oats or barley, or even wheat, when ſown late

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in the ſpring, and when the land is in ſuch tilth as a good farmer would approve of, is likely to be attended with benefit to the crop, equal to the expence of the additional culture, trifling as it may be ſtated.

Fourthly.—The drilling and horſe-hoeing of green-crops, and thereby preventing the neceſſity of ſummer fallowing, is not only an improvement on Mr Tull's ſyſtem, formerly mentioned, but one of the greateſt that has taken place in agriculture ſince the introduction of artificial graſſes. It is extending the garden culture to the field, in a manner of all others the moſt likely to produce beneficial effects. Theſe effects have indeen already appeared in a manner ſo conſpicuous, as cannot have eſcaped the obſervation of ordinary obſervers, and renders any further commentary unneceſſary. Where the practice of horſe-hoeing green-crops has become common, fallow, except on extraordinary occaſions, is never thought of, while a wonderful change for the better appears in the culture, and in the ſuperiority of the crops on every farm. This truly admirable method of culture, is, however, confined chiefly to Scotland, and the north-eaſt of England. But the advantages reſulting from a ſteady adherence to it, require only to be known, to render it general in every part of the iſland.

Where horſe-hoeing huſbandry is adopted for the culture of turnips, potatoes, beans, cabbages, &c. the land is ploughed in the ordinary manner three or four times, as occaſion requires; and the ſeeds and plants being inſerted at the depths, and in the manner mentioned when treating of the culture of theſe various crops, they are afterwards horſe and hand-hoed repeatedly during the following ſeaſon. The conſequence of which is, abundant crops are produced, while the land, in place of being injured thereby, is put in probably the very beſt condition of which it is ſuſceptible, for producing a valuable crop the following ſeaſon. Who but thoſe who have had acceſs to know from the beſt authority, would believe, that while the farmers from Durham, along the eaſtern coaſt, almoſt to Inverneſs, have improved the country, by means of horſe-hoed green crops, to a degree almoſt unknown in any part of the iſland; ſtill, in ſeveral of the moſt favourably ſituated counties in England, many of the farmers conſider, that all the culture requiſite to be beſtowed on a turnip crop is finiſhed, when the ſeed is ſcattered and harrowed in? Yet this is literally the caſe. If ever the labours of the Board of Agriculture are to prove beneficial to the nation, the members, exerting every endeavour to diffuſe a general knowledge of the practices of particular diſtricts, is the ſureſt mean.

Who

Who can ſuppoſe that the farmers in the counties of Bedford, Lancaſter, &c. were they fully informed of the ſuperior crops of turnips, which, by horſe and hand-hoeing, are raiſed in Northumberland, Berwick, Angus, &c. would neglect for a ſingle ſeaſon ſo certain means of cleaning their fields, and augmenting the weight and value of their crops?

Although the writer has condemned, without reſerve, the horſe-hoeing huſbandry, as recommended and practiſed by Mr Tull; and although he has heſitated to determine as to the propriety of recommending ſome of the other methods above mentioned, he is nevertheleſs under no difficulty in giving it as his decided opinion, that the general introduction of the practice of horſe-hoeing and hand-hoeing crops of turnips, potatoes, beans, and cabbages, in rows, at thirty inches or three feet diſtance, would be a more effectual mean of improving the culture, and increaſing the quantity and value of the general produce of theſe kingdoms, than any other that has hitherto been ſuggeſted, or that can poſſibly be adopted *.

Many

* Thoſe who are anxious to acquire more minute information reſpecting drill huſbandry, the writer begs leave to refer to Tull's Horſe-Hoeing Huſbandry, folio edition.——Baker's Experiments in Agriculture.——Du Hamel's Culture des Terres.——Young's Tours;——and, Wight's Huſbandry.

Many are the improvements that have taken place in the conſtruction of drill-machines ſince the days of Mr Tull. The one for which Mr Cook received a patent, is probably as complete as any at preſent in general uſe. It ſows all kinds of grain and ſeeds, and ſeven or eight rows or drills at a time, inſerting the grain at regular depths, and at equal diſtances.

The writer's friend, Mr Bailey, who favoured him with a deſcription of a plough which he invented, a plate of which is given in the ſecond volume, has been ſo obliging as to add to the former favour, by ſending him an engraved figure and deſcription of a drill upon a new conſtruction, invented alſo by himſelf. As this drill is conſtructed on the principle of varying at pleaſure; and while the machine is at work, the quantity of ſeed to be ſown, according to the ſoils, ſeaſons, and other circumſtances; the following deſcription, together with the annexed plate, of this machine, will, it is hoped, prove agreeable to thoſe particularly who practiſe this ſyſtem of huſbandry on a large ſcale.

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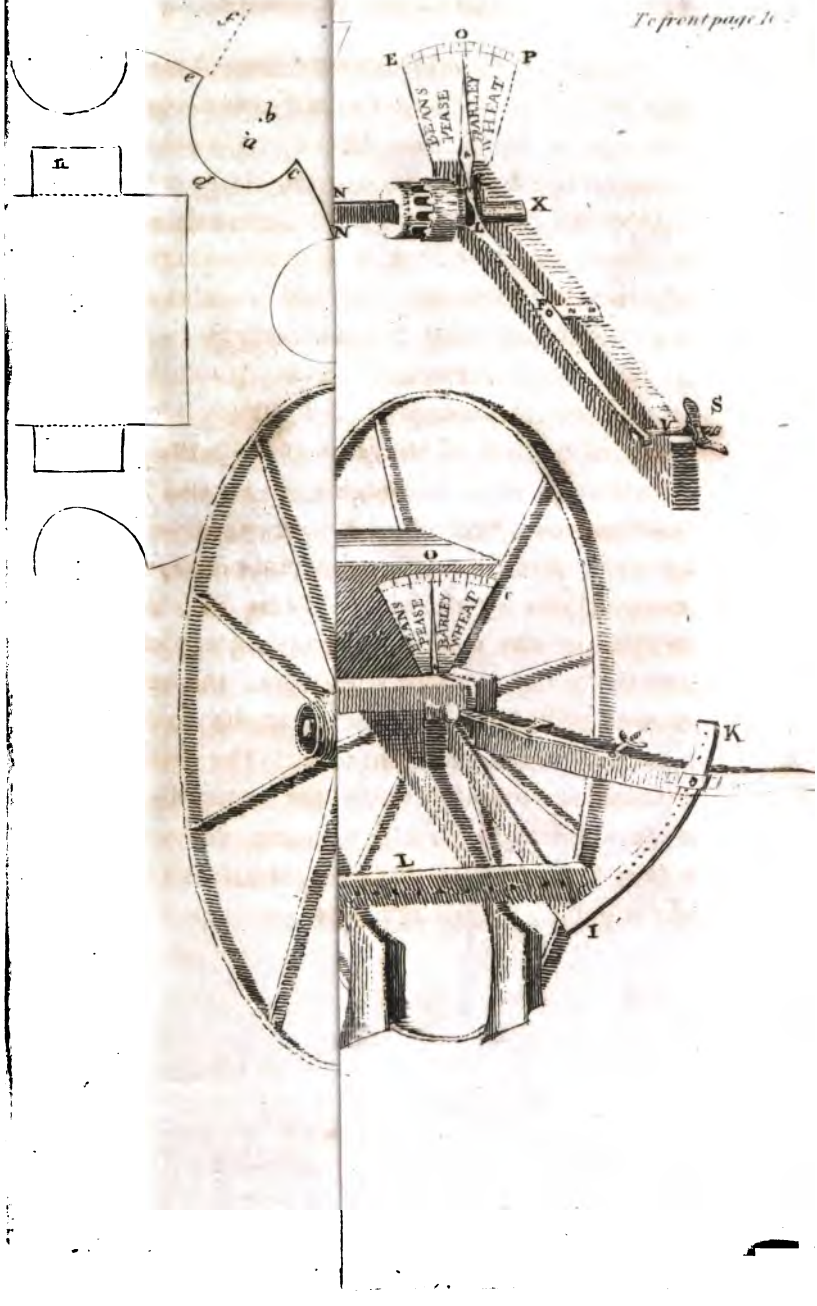

A Deſcription of a Drill, upon a new conſtruction, for ſowing all kinds of Grain, in any quantity, and at any diſtance *.

THE inſide part of the drill, by which the quantity of ſeed is regulated, is repreſented by fig. I. where AX is an iron axle, $1\frac{1}{4}$ inch ſquare, upon which are fixed, at 8 inches diſtance, five braſs-fluted cylinders, the flutes being rather more than a ſemi-circle, $\frac{1}{8}$ of an inch in diameter, or $\frac{1}{8}$ wide, and $\frac{1}{8}$ deep.

RM are hollow cylindrical rims of hammered iron, which have ſegments turned down at right angles, to fit exactly the flutes of the braſs cylinders; the cavities of which are increaſed or diminiſhed, by the ſegments of the iron cylindrical rims ſliding backwards or forwards in the flutes. This is performed in all the cylinders *at the ſame time*, by a rectangular ſpace *n* being made in the braſs cylinders, through which paſſes a ſtraight piece of iron, IN, moving on friction wheels at I, and faſtened to the plates at LK, and alſo to the cylindrical rims RM.

LV is a lever, the fulcrum of which is F, and moved by a ſcrew S paſſing through the frame at

* Invented by J. Bailey, Eſq; from whoſe eſſay on ploughs this deſcription is taken.—Mr Bailey's Eſſay on Ploughs is ſold by Meſſrs Robinſons of London, price 2 s. 6 d.

at V. The end at LK is forked, and made to *fit exactly* the ſides of the collar or plates of iron JK.

By turning the ſcrew S, the lever moves the whole of the rims at once; and the cavities are increaſed or diminiſhed at pleaſure*, and almoſt inſtantaneouſly, to ſow *any kind of grain*, and *in any proportion*, which is ſhewn upon the ſcale EOP, by the index KQ, fixed to the end of the lever at K.

The ſcale is graduated, to ſhew the number of grains of each ſpecies depoſited in a foot.

HTW is a part of the back of the hopper, where UW repreſents the fixed part of the tongue, which collects the ſeed into the cavities, and by its oblique poſition, prevents them from bruiſing. TU is the moveable tongue, and is elevated or depreſſed by the ſcrew T, to ſuit different kinds of grain.

Fig. II. is a view of the machine when ready for work. The ſeed being put into the hopper HO, is delivered by the cylinders (repreſented in Fig. I.) into the ſpouts SP, down which it ſlides to the coulter C; the diſtances of theſe are regulated by a ſquare ſtaple, paſſing

* This is done with the greateſt facility and readineſs, even while the machine is going and at work; which is frequently neceſſary, where the land varies conſiderably in quality, upon different parts of the ſame ridge.

paſſing through the holes in the rail RL; by this means the diſtance of the rows can be varied at pleaſure. And the arch of iron IK, by taking up or letting down, will regulate the depth at which the ſeed is to be depoſited.

The ſpouts and coulters are hung upon a loop, and act independent of each other; and, by being allowed a little play in the rectangular ſtaples, they paſs through every accidental hollow in the land; by which means they never fail to depoſit the ſeed properly in thoſe hollows, which, when the coulters are fixed, is generally left upon the ſurface.

Any particular row is prevented from ſowing, by putting in the ſlots or ſhutters T; and the whole are prevented from ſowing, while turning at the end, by a ſmall pinion N being detached from another, placed upon the nave of the wheel.

The figure in the upper corner of the plate, repreſents a ſection of a braſs cylinder, of the *real ſize*. The ſquare ſpace in the middle, is for the iron axle; the rectangular one, *n*, for the iron ſlides IN; and the cavities *cde*, for the grain, are formed by deſcribing the fore part *cd*, from the centre *a*, with a radius of $\frac{5}{16}$ of an inch; and the back part *de*, from the centre *b*, with a radius of $\frac{3}{8}$ of an inch. *ef* is the poſition and place of the tongue TU.

For turnips, the large hopper is taken off, and a ſet of ſmall ones fixed upon the ſemi-oval cavities at the end of the braſs cylinders. The quantity of ſeed is regulated by a tongue, which ſcrews up or down at pleaſure.

For ſowing beans at wide intervals, *viz.* from 24 to 30 inches, Mr Bailey uſes a drill with only one wheel and one cylinder, which a man wheels before him in the furrow, or (what he finds much better) may be fixed in the body of a ſmall plough, drawn by a ſingle horſe; by this means, the wheel paſſes along a ſmooth ſurface, between the land-ſide and mould-board, and the ſeed is depoſited at a regular depth: Two inches anſwers very well for beans. With the ſame ſmall plough and drill, he has ſown both wheat and barley, at ſix or ſeven inch intervals, and one and one-half or two inches deep, with good ſucceſs; and, for ſmall concerns, this cheap and ſimple apparatus, will probably be found the moſt eligible.

CHAP-

CHAPTER XXI.

Live Stock;—as Horſes, Cattle, Sheep, &c.

IN the early ages of the world, herds of cattle, and flocks of ſheep, conſtituted the riches of the inhabitants. This muſt ever be the caſe, not only in infant ſtates, but in thoſe alſo where the uſeful arts have made greateſt progreſs. The riches of any people conſiſt chiefly in grain, and in valuable breeds of live ſtock.—By theſe only can the actual proſperity of a nation be eſtimated.—Without theſe, manufactures cannot be eſtabliſhed, commerce extended, nor population increaſed, nor ſupported. Peru is rich in gold and ſilver; but the corn-fields, and the horſes, cattle, and ſheep, of Great Britain, are treaſures infinitely more valuable. Gold and ſilver, and paper-money, have no other value, than what they derive from the productions of the earth:—Theſe are indiſpenſably requiſite for the ſubſiſtence of man, and in theſe alone centres real wealth.

Although

Although a deſire to improve the culture of our fields, has evinced itſelf almoſt generally in the improvable part of this iſland, yet it is aſtoniſhing, in how few diſtricts attention has been beſtowed to improve the breeds of the different ſpecies of live-ſtock; or, at leaſt, with what little ſucceſs the exertions that have been made have hitherto been attended. Some individuals, indeed, in a few particular counties, poſſeſſing knowledge and perſeverance, have advanced their own intereſt, and rendered an important ſervice to the community, by devoting their attention chiefly to this object. Much, however, remains to be done. A wide field is ſtill open to active and intelligent farmers, who, by combining improved breeds of ſtock with the proper cultivation of the ſoil, may raiſe Britiſh huſbandry to the higheſt degree of perfection of which it is capable.

It is not poſſible, in the limits preſcribed to this work, to enter ſo fully on the ſubject of live-ſtock, as its importance merits. It is a ſubject, on which many uſeful volumes might be written; and, at the preſent period, with peculiar advantage.

It is obvious that, in conſequence of the improved cultivation of our fields, live-ſtock, ſuperior in ſize and value, can be maintained with advantage on many farms, where puny and unprofitable breeds are now kept. The increaſe of

of luxury, which is univerſally acknowledged, and the additional demand for butcher-meat conſequent thereon, renders attention to improving the breeds of cattle, ſheep, ſwine, &c. of more importance than at any former period; while the demand for horſes, either for the coach, the ſaddle, the cart, or the plough, will always continue to increaſe, as long as luxury, manufactures, and agriculture, maintain a progreſſive motion. For theſe reaſons, the circumſtances neceſſary to be attended to in breeding, rearing, and managing live-ſtock, cannot be too fully explained; nor the knowledge of the beſt methods to be adopted in theſe reſpects, too generally diffuſed.

In the following ſections, the various ſorts of live-ſtock will be found claſſed according to their value.

SEC-

SECTION I.

Horſes.

At what period horſes were brought into this iſland, or whence, or by whom, imported, is of very little conſequence to have aſcertained. This much, however, we know, that when Julius Cæſar invaded it, he was aſtoniſhed not only to find horſes in abundance, but theſe ſo well trained to war, as to alarm and ſhake the courage, even of the Roman legions.

It has already been obſerved, how attentive the Romans were to improve the countries which they conquered; and that they embarked in ſeveral very arduous undertakings, in order to lay a ſtable foundation for the improvement of Britain. Hence it may be inferred, that they would import horſes from the continent, for the double purpoſe of recruiting their cavalry, and performing ſeveral of the operations connected with huſbandry. After the Norman conqueſt, that great national object, "improving "the breed of horſes," ſeems to have been in a great meaſure neglected; inſomuch, that in the reign of Henry VIII. it became neceſſary to enact ſome ſevere ſtatutes againſt allowing ſtallions

lions of two years old, in ſome places under fourteen, and in others, where the breeds were of a larger ſize, under fifteen hands high, to run in any foreſt, or common, where mares were paſtured. Theſe ſtatutes empowered the magiſtrates of the bounds to ſurvey the foreſts and commons, and to cauſe kill all ſuch mares as they found therein, that had not the appearance of producing foals of a proper ſize. It was alſo enacted, about the ſame period, that a certain number of breeding mares, not under thirteen hands high, ſhould be kept in every deer-park. Theſe ſtatutes, arbitrary as they may appear, in theſe days ſeem, from the ſtate of degeneracy to which the breed of horſes had at that time ſunk, to have been in ſome degree excuſable; for we are informed, that a few years afterwards, that is, during the reign of Queen Elizabeth, when the Spaniards threatened to invade England, there were not found in that extenſive kingdom, after an accurate examination, more than three thouſand horſes, that could be uſed for the purpoſes of war: A number ſo contemptible, that, were not the fact well authenticated, it would hardly gain credit. The deficiency of horſes for defence, which, on this memorable occaſion became ſo evident, was probably the reaſon that firſt induced the people of rank and fortune to turn their attention to increaſing and improving the breed. In proceſs of time, ſtallions were imported

imported from foreign countries. The cuſtom of giving plates, in order to create a competition among the breeders of ſwift running horſes, was eſtabliſhed *, and other meaſures adopted

* The cuſtom of giving King's plates was eſtabliſhed on very laudable principles, namely, as a mean of creating a ſpirit of emulation among the farmers who at that period were in the habit of breeding horſes. That it had the deſired effect, is unqueſtionable; but that the continuing theſe premiums, is now attended with any good conſequences, is very doubtful; while, on the other hand, it is certain, many bad effects reſult from the practice. In the *firſt* place, it has been ſo long continued, that the original intention, in place of being longer anſwered, is defeated; the horſes, now deemed fit for the race-ground being of ſo ſlender a form, as to be incapable of anſwering any uſeful purpoſe. *Secondly*, The annual loſs of labour which the nation ſuſtains by the working part of the community attending at theſe places, is immenſe; and, *thirdly*, The numerous horſe-races eſtabliſhed in the various parts of theſe kingdoms, and which are every year increaſing, in place of being ſchools at which the morals of the people are likely to be improved, are, as every intelligent perſon muſt have obſerved, ſeminaries for initiating the lower claſs of people into habits of idleneſs and debauchery. In a word, continuing to give King's plates and city purſes is worſe than the moſt extravagant waſte of the public money. It is nothing elſe than Government holding out incitements to the inhabitants of Great Britain to become a nation of gamblers; a ſcience, in which it is;

ed to draw the attention of the farmers to this important object; and which was, by degrees, ſo completely effected, that Engliſh horſes, whether for the courſe, the field, the road, the coach, or the purpoſes of husbandry, have been long conſidered, if not ſuperior, at leaſt equal to thoſe of the other parts of Europe.

There are ſuppoſed to be only two diſtinct breeds of horſes in Great Britain: The race or blood ſort, and the cart or plough horſe. Some have imagined the ſmall ponies common on the mountains of Wales, and in the northern parts of Scotland, are a diſtinct breed from the others.

This, however, it is probable is not the caſe. The only perceptible difference between them and the ordinary cart-horſe of England, and the ſouth of Scotland, is in the ſize; and this may be accounted for in a very ſatisfactory manner, by obſerving, that theſe ſmall horſes are bred in cold, rainy, mountainous diſtricts; that they are reared without attention; and that when broken into work, they are treated and fed with the greateſt degree of careleſneſs.

The

but too true, they are making rapid progreſs; and in which, it is highly probable, they would ſoon arrive at a ſufficient degree of proficiency, either for the public good, or the happineſs of individuals, were the foſtering hand of Government in this reſpect to be withdrawn.

The long eſtabliſhed practice of importing ſtallions and mares from the Continent, and of croſſing theſe with the ancient breed of the country, has been the means of producing as many varieties in the ſize as in the proportion and temper of the Britiſh horſes. Some are adapted for running with great ſwiftneſs; others, for travelling, hunting, &c. others for war; and others for draught; of the laſt, or thoſe which are chiefly employed in the operations of huſbandry, it is only intended to take notice. The names by which the different breeds of farm-horſes in England are diſtinguiſhed, are as follow, *viz.*

The Black Cart-Horſe.

The Cleveland Bay.

The Suffolk Puneh;

And,

The Small Welſh Ponies.

An account of the breeds of horſes in each particular county in Great Britain has already been given. Before deſcribing the beſt methods to be adopted for breeding, rearing, and managing horſes with advantage, it may not be improper

proper to ſpecify a few of the particulars in which each of the above breeds, or rather the varieties that have ſprung from the two original breeds, differ from the others.

The black cart-horſe is the common breed of ſome parts of the counties of Lincoln and York, and general in the counties of Leiceſter, Staffordſhire, Derby, and Warwick. This breed is in ſize ſuperior to any other in the kingdom. Naturally inactive, and ſlow in motion, clumſy, and frequently ill proportioned, infinitely better adapted for drawing ponderous loads on the London pavements, than for ploughing and harrowing, or for performing any of the other operations connected with huſbandry. Reſpecting the breed of black cart-horſes, Mr Marſhall thus writes: "The breed of grey rats with which "this iſland has of late years been over-run, is "not a greater peſt in it than the breed of black "fen horſes *."

The largeſt of this breed are employed in London, and other cities, as dray-horſes. The next ſize are employed in huſbandry, and as coach-horſes; and the ſmalleſt are bought up by Government, and trained for war.

The Cleveland bays are clean well-made animals; very ſtrong and active; and are equally in

* See Marſhall's Rural Oeconomy of Yorkſhire, Vol. ii. page 164.

in requeſt for the coach, the ſaddle, and the plough. They are capable, both of great and long continued exertion. Great numbers are annually ſold, when young, at the fairs in the diſtrict, or in the neighbourhood. The beſt are uſed as coach-horſes; thoſe of lighter bone for the ſaddle; and the remainder in the plough and cart.

The real Suffolk punch is a ſhort plain looking horſe, very compact, and more active and hardy than any other in the low parts of England. This breed has been much improved of late years. The Suffolk horſes are, when compared with the others before mentioned, of a ſmall ſize, not exceeding fifteen, or fifteen and a half hands high; but ſo active, that the farmers in that county and in Norfolk very commonly plough two acres a day in the buſy ſeaſons with a pair of theſe horſes. They are chiefly employed in the operations of huſbandry.

There are three breeds of horſes in Wales, or more properly horſes of three different ſizes; as, the Welſh ponies, the larger breed of the country, and a croſs breed between ſtallions from England, and the country mares. The firſt are very diminutive, and it may be added very uſeleſs animals, fit only for boys to ride upon, although ſometimes employed in carrying coals, *&c.* in baſkets, to the towns in the neighbourhood. The ſecond, although remarkably hardy,

dy, are below the proper ſize that ought to be employed in draught; and being in general ill ſhaped, are comparatively of little value. The third may be deſcribed, as being ſtout, active, hardly well ſhaped, and eaſily reared. They are about fifteen hands high; and upon the whole, conſidering the ſtate of agriculture in that country, probably as perfect a breed as ought to be introduced for a conſiderable time to come.

If Scotland cannot boaſt of as valuable breeds of farm-horſes as England, it may at leaſt contend for poſſeſſing as great varieties. It has

The Lanark or Clydeſdale;

The Garron;

The Galloway;

And,

The Small Highland Horſes.

Lanark is the only county in Scotland which can be ſaid to poſſeſs a valuable breed of plough horſes. The reaſon of which is aſcribed to an adventitious circumſtance that happened in that diſtrict about the end of the laſt century. One of

of the Dukes of Hamilton brought over ſix coach horſes (ſtallions) from Flanders. By croſſing theſe with the beſt of the country mares, the breed, now ſo well known by the name of the Clydeſdale, was produced. The Clydeſdale horſes are probably inferior to none in the iſland, either for the cart or the plough. They are from fifteen to ſixteen hands and a half high; ſtrong, active, and ſteady in harneſs. From Clydeſdale, and ſome of the neighbouring diſtricts, the farmers in the ſouth and ſouth-eaſt parts of Scotland are ſupplied with horſes. Many are ſold for the coach and the ſaddle, and conſiderable numbers are alſo ſent into England.

The Garrons are the ancient breed of country horſes, without having been improved by croſſing with other breeds. Horſes of this deſcription are ſtill common in thoſe cultivated diſtricts, which lye adjacent to the mountains, and where the more improved modes of huſbandry have not been generally introduced. They are a ſtrong hardy race, rather under the middle ſize, and partaking more of the form of the Suffolk punch, than of the clean-boned, fine ſhaped, Cleveland bay. They meaſure about fourteen or fourteen hands and a half; and with due attention, might be rendered a very valuable breed.

The

The Galloway horſes are much about the height of thoſe laſt mentioned, but ſuperior in ſhape, and lighter in bone. They are extremely well calculated for the road, as they move eaſily, and are capable of enduring very great fatigue. The ſuperior excellence of the Galloway breed is ſaid to be owing to the following circumſtance: Some ſhips of the Spaniſh Armada, loaded with horſes, having been wrecked on the coaſt of Galloway, ſeveral ſtallions were thrown aſhore. Theſe, having been croſſed with the country mares, produced the breed ſo well known under the name of Scotch Galloways, but which, owing to inattention, is ſaid now to be greatly degenerated.

There are two ſorts of horſes in the Highlands of Scotland; the ſmalleſt are to be found in Zetland, Orkney, Caithneſs, and the weſtern iſlands. They are ſeldom above nine or ten hands high; and although hardy, they are, like the ſmall Welſh ponies, very uſeleſs animals, being too ſmall for the plough, or indeed for performing properly any operation of huſbandry. The other ſort are common in the Highlands of Perth, Argyle, Aberdeen, and Inverneſs. They are conſiderably larger, being between thirteen and fourteen hands; but as no attention is beſtowed on improving the breed, and as they are miſerably miſmanaged in every ſtage of life, they cannot

cannot be conſidered either as a valuable or profitable ſtock.

Theſe are the diſtinguiſhing characters of the breeds of horſes employed in the operations of huſbandry in theſe kingdoms. It will be univerſally allowed, that wherever horſes are employed in agriculture, it becomes the buſineſs of every farmer to adapt the ſize and ſtrength of his horſes to the buſineſs he has to perform. The writer has long been of opinion, that many Engliſh farmers ſacrifice too much to ſhow. If the expence of keeping, the ſlow movement, and the additional riſk from accidents or death, which attach to the keeping the large high priced black cart-horſes, be conſidered, thoſe farmers who prefer them to the compact, active, hardy ſorts, whether the Cleveland, the Suffolk, or the Clydeſdale, which are the three ſorts in the iſland beſt calculated, in every reſpect, for the farmer's uſe, will find, that their predilection for theſe large fine horſes is attended with a very heavy extra expence. The value of a horſe ought to be eſtimated by the farmer, not ſo much according to the price at which he was purchaſed, or at which he might be ſold, as according to the extent of work which he will perform without being fatigued. If, for inſtance, a pair of Suffolk or Yorkſhire horſes will plough two acres a-day during the ſeed-ſeaſon, they are more valuable for labour than a pair of

large heavy Lincolnſhire horſes, that are hardly able to perform half the work: While the firſt coſt, the expence of keeping, and riſk of accidents, is very conſiderably leſs. If this reaſoning be juſt, it will occur to every reader, that the whole under ſized tribe of horſes, particularly thoſe reared on the mountains of Wales, and in the remote Highlands of Scotland, are of little value, either in an agricultural or commercial view. Were theſe unimprovable diſtricts occupied in the rearing of black-cattle and ſheep, it would be infinitely more advantageous for all concerned. Lands, devoted to the rearing of ſuch uſeleſs animals as thoſe ſmall horſes, may be denominated waſtes, in every ſenſe of the word.

A particular, and much reſpected, friend of the writer's, Mr George Culley of Eaſtfield in Northumberland, publiſhed a Treatiſe on Live-Stock, ſome years ago. Very few perſons in Great Britain have ſtudied the ſubject ſo much; perhaps with one exception *, none ever beſtowed more attention, or ſhewed greater perſeverance, in purſuing the uſeful and laudable buſineſs of improving the breeds of the different ſpecies of live-ſtock, to ſuch an extent, and with greater ſucceſs. It may therefore be agreeable to ſuch readers, as have not ſeen the above-mentioned Treatiſe, to peruſe Mr Culley's deſcription, of a well-formed horſe,

* Mr Bakewell.

and which cannot fail to be the more agreeable, as it is free of thoſe technical terms, which are ſo commonly uſed in deſcriptions of this ſort. This eminent breeder obſerves, that whatever be the variety of the breed, the form ſhould anſwer the following deſcriptions, *viz.* His head ſhould be as ſmall as the proportion of the animal will admit; his noſtrils expanded, and muzzle fine; his eyes cheerful, and prominent; his ears ſmall, upright, and placed near together; his neck, riſing out from between his ſhoulders with an eaſy tapering curve, muſt join gracefully to the head; his ſhoulders, being well thrown back, muſt alſo go into his neck (at what is called the points) unperceived, which perhaps facilitates the going much more than the narrow ſhoulder*; the arm, or fore thigh, ſhould be muſcular, and, tapering from the ſhoulder, meet with a fine ſtraight, ſinewy bony leg; the hoof circular, and wide at the heel; his cheſt deep, and full at the girth; his loin or fillets broad and ſtraight, and body round; his hips or hooks by no means wide, but quarters long, and tail ſet on ſo as to be nearly in the ſame right line at his back; his thighs ſtrong and muſcular; his legs clean and fine boned, the

* Whoever has obſerved a greyhound or a hare, will perceive, how very wide they are made at the upper part of the ſhoulders, and there are few animals that move with ſo much eaſe and ſwiftneſs.

the leg bones not round, but what is called lathy or flat *.

In regard to the properties of a breeding mare; ſhe ſhould be well ſhaped; poſſeſs a gentle diſpoſition; have a large carcaſe, conforma to her height; pretty full bellied, and likely to become a good nurſe, that is, to have plenty of milk. In common it is too much the practice to be more attentive in the choice of a ſtallion than of a breeding mare. This conduct is improper, in ſo far as it is known, from general experience, that, in regard to form, and other good qualities in the progeny, more depends on the mare than on the horſe. It is of importance to make choice of a ſtallion as ſimilar in colour and form to thoſe of the mare as poſſible; by following this method, there is a much greater probability that the foal will poſſeſs the joint properties both of father and mother, and turn out more agreeable to the wiſhes of the owner, than when violent croſſes are attempted.

When a half bred mare, for inſtance, is put to a great heavy, clumſy cart horſe, or *vice verſa*, the ſtock turns out a kind of mongrel or baſtard breed, ſeldom poſſeſſing, in any conſiderable degree, the ſtrength or ſize of the one, or the ſpirit, activity, and fine bone of the other.

In

* See Mr Culley's Obſervations on Live-Stock, ſecond edition, p. 21.

In ſhort, although croſſing the breeds of horſes has, upon the whole, been productive of good conſequences, notwithſtanding it has been often injudiciouſly conducted, yet thoſe who have adhered to the rule above mentioned, will be found, in every inſtance, to have proceeded fartheſt on the road to perfection. If the great cumberous cart-horſe of Lincolnſhire be found too large in ſize, and too ſlow in motion, for performing the operations of ploughing, harrowing, &c. with the requiſite expedition, why attempt to reduce his ſize, or increaſe his activity, by unnatural croſſing with the ſmaller, more ſpirited, and more uſeful breeds of other diſtricts? The better way would be, to make choice of a breed poſſeſſing naturally the greateſt number of the wiſhed-for qualifications, to which, by proper management, might alſo be added, by degrees, and with infinitely more certainty, any particular properties which were deemed wanting.

Palladius and Varro both direct, that a mare ſhould not be allowed to take the horſe before ſhe be two years old, nor after ſhe is ten; becauſe, ſay they, when paſt that age, a weak and unprofitable breed may be expected. Palladius alſo directs, that the ſtallion ſhould be pampered and kept high with food; and adds, that if he be not allowed to cover till he have completed

ed his fourth year, he will laſt very well till his twentieth.

The practice of the horſe-breeding farmers in theſe kingdoms, is nearly agreeable to the rules laid down by theſe Roman writers; the only material difference being, that the mares are not ſuffered to take the horſe, till they be three or four years old; but continue to breed to a greater age than that above mentioned.

The uſual ſeaſon when a mare covets the horſe, is from the beginning of April to the beginning of July. The month of June is conſidered the beſt ſeaſon in Great Britain; although from the middle to the end of May is more approved of on the Continent, particularly in Normandy, where the farmers devote much of their attention to this branch of huſbandry; and in which, in regard to uſeful farm-horſes eſpecially, they have ſucceeded, perhaps, beyond thoſe in any other part of Europe. The above difference, as to the time when a mare ſhould be allowed to take the horſe, in the different countries, is eaſily reconcilable: A mare goes eleven months and a few days with foal; and the great object with all farmers, where practicable, is, to have the mare covered at ſuch a period, as to inſure abundance of graſs, and the return of warm comfortable weather, before the foaling ſeaſon.

In

In ſome diſtricts, it is uſual to give over working a mare, ſome few weeks before the time at which it is expected ſhe is to drop her foal. It is, however, by no means a common practice. In Yorkſhire, and in thoſe midland counties, where the breeding and rearing of horſes are better underſtood than in any other part of the iſland, they are often worked till the very time of foaling. Great care is neceſſary, in working and managing a mare heavy with foal: An over-heat, too ſevere exerciſe, a fright, or a ſudden and violent jerk, are very apt to cauſe an untimely birth, whereby the foal is loſt, and the life of the mare very much endangered.

It is generally underſtood, and is an opinion, it is believed, well-founded, that a mare may be covered on the ninth day after ſhe has foaled, with a greater certainty of ſucceſs than at any other period. This practice is often followed; but in ſuch caſes, the mare ought to be fed in an extraordinary manner, otherwiſe it is impoſſible ſhe can do juſtice to her preſent and her future foal. Probably modern farmers would come nearer their purpoſe, were they to follow the example of the Romans, and content themſelves with one foal in the two years. In England, and in the improved parts of Scotland, a mare after having foaled, is turned, together with the foal, into a paſture-field, and is allowed two or three weeks reſt, before ſhe is again worked,

worked, either in plough or cart; the foal being allowed the meanwhile to ſuckle at pleaſure. After having had a few weeks reſt, the mare is again worked in the uſual manner; the foal being commonly ſhut up in a houſe during the hours the mare is at work. In Yorkſhire, ſome farmers are particularly careful not to allow the mare to go near the foal, after her return from labour, till her udder has been bathed with cold water, and not till moſt of the milk is drawn from it. Theſe precautions are uſed, with a view of preventing any bad conſequences from the foal's receiving over-heated milk. Another practice, and which ſeems ſuperior to the other, is alſo common in Yorkſhire, and in many parts of Scotland: After the foal is a few weeks old, and has acquired ſtrength and agility enough to follow its mother, it is allowed to attend her in the field, during the hours of labour, and to ſuckle occaſionally. By this means, the foal receives ſufficient exercife; nor can any prejudicial effects happen from the over-heated ſtate of the milk, as the foal is allowed to draw it off repeatedly, and at ſhort intervals. Theſe may be conſidered as the general modes of management, in thoſe parts of Great Britain above mentioned, during the period while the foal is allowed to ſuckle its dam, which is uſually about ſix months; that is, from the time of

foaling till Michaelmas, which is the period at which foals are generally weaned.

In the mountains of Wales, and in the Highlands of Scotland, the management is very different. There, the breeding mares are never worked during the ſummer. They are driven to the hills and mountains, at the cloſe of the barley-ſeed ſeaſon, where they remain, till the inclemency of the weather force them to return for ſhelter. But their ſcanty ſubſiſtence, the labour they are ſubjected to in procuring their food, and the moiſtneſs and coldneſs of the climate in the latter part of the ſeaſon, render both themſelves and their progeny of little value.

The method of treating foals in England, after they are weaned, is to put them immediately into a good freſh paſture, where they remain as long as the weather continues moderate. On the approach of winter, they are fed with a ſufficient quantity of hay, placed in a ſtable or hovel, erected in the field for the purpoſe, and into which they have free acceſs at all times. The next ſummer they are put into other paſtures, commonly the moſt indifferent on the farm, where they remain till the beginning of the following winter, when they are either allowed to range in the paſture-fields, or brought home to the ſtraw-yard. The inclemency of the winter in Scotland, and the great falls

falls of ſnow which generally take place, renders it neceſſary always to houſe the foals during that ſeaſon. They are fed, for the moſt part, on ſtraw, and have an allowance of corn once or twice a day. Sometimes hay is allowed them, in which caſe corn is conſidered as leſs neceſſary.

The time for gelding colts is uſually the ſame in both kingdoms, namely, when they are about a year old. Although in Yorkſhire, this operation is frequently ſuſpended till the ſpring of the ſecond year, eſpecially when it is intended to keep them on hand, and without employing them in labour till the following ſeaſon.

Young horſes are ſometimes trained to work at two, but more frequently not till three years old. The firſt thing is, to teach them docility, by leading them frequently to and from the watering-place. The work in which young horſes are uſually employed, is harrowing; to which they are inured by degrees, not being kept at labour above one-half the day, for the firſt few weeks; and afterwards worked only very gently, for the remainder of the ſeaſon.

It was obſerved, when giving a geographical and agricultural deſcription of the different counties in England, that it was a common practice, for the breeders of horſes to diſpoſe of the young ſtock at two or three years old, to farmers in the ſouthern diſtricts, who, after keeping and working

them for a like period, diſpoſed of them to dealers from London, and other large cities. This kind of traffic is very common, and is equally convenient and advantageous for all the parties concerned. The breeder, by meeting a ready and conſtant market for his young colts, at the periods when he wiſhes to diſpoſe of them, is enabled to continue breeding a regular number, without the riſk of being overſtocked. The farmers who are the firſt purchaſers, may diſpoſe of their ſtock of horſes to the London dealers, when proper opportunities offer; as they are certain that a ſupply of young horſes will arrive in ſufficient time for anſwering their purpoſe. The London dealer, again, in place of travelling to the northern diſtricts of England, where the greateſt number of young horſes are reared, can ſupply himſelf with ſuch as are more ſuitable for his purpoſe, in the counties in his near neighbourhood. Beſides the parties more immediately intereſted in this trade, there are generally no leſs than two agents, who make a living by carrying it on. The firſt is the *jockey*, or *jobber*, who purchaſes the colts from the breeder, and diſpoſes of them to the ſouth country farmer. The ſecond is the dealer, in the neighbourhood of London, who either makes the purchaſe from the ſouth country farmer, on his own account, and ſtands the chance of a ſale in London, or who purchaſes on commiſſion,

for

for behoof of the London dealer. The trade of buying and ſelling horſes, is alſo carried on in Scotland, by the ſame deſcription of people; and of whom it may be ſaid, as well as of their brethren in England, that they are *knowing hands*. Probably it would be difficult to determine, whether the profeſſional horſe-dealers on the ſouth or the north ſide of the Tweed poſſeſs the greateſt knowledge of the *arts* uſually practiſed for making up horſes for ſale. The methods practiſed by the jockies in the North Riding of Yorkſhire, is thus deſcribed by Mr Tuke, who wrote the Report of the State of Agriculture in that diſtrict. "They (the young horſes) "are uſually ſold with their full tails to "dealers, who afterwards make them up more "according to art. *The firſt buſineſs is, to draw "their corner teeth; in order to make three and "four years old horſes have the mouths of thoſe of "five.* They alſo undergo the operations of "docking and nicking; and after having been "kept two or three months on maſhes, made of "bran, ground oats, or boiled corn, they are "ſold to the London dealers, who, it is ſaid, ſell "theſe three or four years old horſes, as if they "were five years old: They are then taken into "immediate work, either for the coach or ſad-"dle; *and in a few months are completely deſtroy-"ed, by this premature and too ſevere labour.*" Mr Tuke ſeems ſenſible, that the drawing of the

the corner teeth of young horſes is done with *a fraudulent intention*; but appears anxious, at the ſame time, to exoner the dealers in the North Riding of Yorkſhire, and to ſaddle the London gentlemen of that profeſſion with the blame. After the above account, he immediately adds, "The drawing of the teeth *is not a fraud practiſed on the London dealers: They know the deception, and inſiſt upon its being done by the country dealers.* It is requiſite to be done "ſome months before the London dealers finally ſell them for uſe, or the tooth which denotes a horſe to be five years old would not "be grown, conſequently the deception could "not have taken place."

Although this practice of drawing a horſe's corner teeth, in order to make him appear older than he really is, has ſcarcely never been attempted by any horſe-dealer in Scotland, yet that fraternity are much belied, if ſome of the members do not occaſionally adopt means *as honourable*, to effect a purpoſe diametrically oppoſite; namely, to make an old horſe look younger than he really is. The means adopted to effect this laudable end is, (when a horſe becomes ſo old as to loſe the uſual mark in his corner teeth, by which his age, till he be ſeven or eight, is uſually aſcertained), to drill a hole, or burn out one with a hot iron, in the corner teeth, as ſimilar in ſize and form to the natural cavity

cavity as poſſible; which, when done with any degree of judgment, is ſufficient to impoſe on ſuch, at leaſt, as have not ſerved an apprentice-ſhip to the horſe-jockey trade; or who are not in poſſeſſion of other rules of judging, than thoſe on which the generality of farmers rely.

Where no arts are uſed to deceive, the uſual manner by which the age of a horſe or mare is aſcertained, is, by examining their teeth. Theſe are forty in number. Of theſe, twenty-four are double teeth, called grinders; four tuſhes, and twelve fore-teeth. From the fourth to the eighth year, the age is known by the fore-teeth, and afterwards can only be determined by the appearance of the tuſhes. The fore-teeth begin to appear when the foal is ten or twelve days old. Theſe are called the foal teeth, and are ſhort and ſomewhat round.

They drop out at different periods; and are afterwards replaced by others. Between the age of two and three years, a colt ſheds the four middle fore-teeth; two in the upper, and two in the under jaw, and the following year four others, one on each ſide of the former. The following year, again, four teeth drop out, next to thoſe which were laſt ſhed, and are replaced by four others, which are called the corner-teeth, and by which, as has been obſerved, the age of a horſe is afterwards known for three or four years. Theſe four teeth, (each being the third, reckoning

reckoning from the middle of the jaw), are eaſily diſtinguiſhed from the others, by being hollow, and having a black mark in the hollow or cavity.

Theſe marks gradually diminiſh till the ſeventh or eighth year, when the cavity is filled up, and the black mark or ſpot entirely diſappears.

The tuſhes, which are theſe next to the corner teeth, afford then the only rule by which the age of a horſe can be determined with any degree of certainty. They begin to ſhoot when the animal is about four years old, and appear ſharp in the points till it be ſix or ſeven. Between the ninth and tenth year, thoſe in the upper jaw become blunted, and increaſe in length; and as the gum begins to contract conſiderably, the longer the tuſks appear; and of courſe, the more of them that appear, the older is the horſe. Nothing, however, but experience can enable a perſon to judge with preciſion, reſpecting the age of a horſe. In juſtice to the horſe-jockey tribe, it ſhould be obſerved, that in many horſes, the black mark or ſpot in the corner-teeth is never entirely effaced, ſo that a careleſs obſerver may in ſome caſes be miſtaken, unleſs he attends to the following circumſtance, which univerſally happens, *viz.* that the hollow or cavity of the corner teeth is completely filled up, and that the tuſks of an old horſe never fail to have the appearance above deſcribed.

The

The diſeaſes to which horſes are liable are numerous; and ſome of them of a very infectious nature. Theſe will be found treated of at great length in various books of farriery, where alſo the beſt means of prevention and of cure are explained. It ſhall only be remarked here, that many of the diſeaſes to which horſes are ſubjected, are brought on by over-exertion, and after miſmanagement. Where neither of theſe are permitted, farm-horſes in particular generally enjoy an almoſt uninterrupted ſtate of good health, and live and are uſeful to an old age. This remark naturally leads to making ſome obſervations on the management of farm-horſes, in regard to food, dreſſing, and exerciſe, and with which it is intended to conclude the ſection.

There are few parts of Great Britain where a more uſeful race of farm-horſes is to be found than in the Carſe of Gowrie; fewer ſtill, where, conſidering the tenacious nature of the ſoil, more land is uſually ploughed, with the ſame ſtrength, (two horſes conſtituting the team), and perhaps none in which farm-horſes are better fed, or managed with greater attention. For theſe reaſons, it is propoſed to detail the mode of working and treating horſes in that diſtrict.

In the ſpring, when the ſeed-ſeaſon commences, the hours of labour are increaſed, and food ſuperior in quality to that on which the working horſes were maintained during winter, is allow-

ed. They are then generally fed on peaſe-ſtraw, or on hay; and, beſides at leaſt half-a-peck of dry oats, or of oats with a mixture of peaſe or beans, which is given to each horſe in equal portions, when they return from the field, morning and evening, a ſtated allowance of the refuſe or dreſſings of the grain, after having been mixed with chaff, and either ſoaked in cold water, or boiled, is alſo given every morning and afternoon, before labour commences*. Thus, during the height of the ſeed-ſeaſon, the farm-horſes in the Carſe of Gowrie are regularly fed four times a-day with corn.

In ſummer, they are kept conſtantly in the ſtable, except during the hours of labour, and are allowed as much cut clover as they are able to eat. In autumn, during the hurry of the wheat-ſeed ſeaſon, as well as when the corns are carrying home to the ſtack-yard, an allowance of corn is alſo given, and which is continued in conſiderable quantities as long as the weather continues favourable for ploughing. On the commencement of winter, and when labour begins to ſlacken, the horſes are commonly fed on ſtraw,

* In place of performing all the labour of the day at what in England is called one journey, throughout the whole of the year, the farm-horſes in Scotland go two journies from the middle of March till the end of September: A much better method certainly, as thereby the labour is divided, and the horſes are allowed to reſt for four or five hours during the heat of the day.

ſtraw, the allowance of corn being limited to about half a peck a-day; on many farms, the allowance of corn is wholly withdrawn, and potatoes, properly cleaned, ſubſtituted in its ſtead. The farm-ſervants in this diſtrict, partly owing to the ſtrict injunctions they receive from their maſters, and partly from a laudable pride which they poſſeſs of having their horſes look better than thoſe of their neighbours, are very careful in cleaning the horſes of which they have charge. On returning from the field, they regularly make them, (after allowing them time to drink), walk through a pond, to waſh off the dirt from their legs; and when put into the ſtable, and the harneſs taken off, they rub them pretty ſmartly with ſome clean ſtraw; and afterwards, when in condition for currying and dreſſing, theſe operations are performed with a very conſiderable degree of attention. With ſuch treatment, and when horſes are not over-heated, they will undergo an immenſe degree of fatigue. At the ſame time, the more perſonal attendance a farmer beſtows on his horſes, the better they will thrive. And if he will always bear in mind the old proverb, that "the maſter's eye makes "the horſe fat," there is little reaſon to doubt but he will be able to conduct the various operations of huſbandry with more eaſe, and at leſs expence, than if he were negligent in this reſpect.

SECTION II.

Cattle.

At what period Britain was ſtocked with cattle, or who were the firſt importers, it is impoſſible to determine. For the reaſons already mentioned, there can be no doubt, that the Romans not only increaſed the number by new importations, but were alſo attentive to the improvement of the original breed. That people, we know, from their agricultural writers, were very competent judges of the valuable properties of which cattle ought to be poſſeſſed. The ox was with them the chief beaſt of draught. Columella is very particular in his account of cattle; and the directions given by Palladius for chuſing an ox, would not diſgrace the moſt eminent breeder of modern times to give.

The practice of uſing oxen in the plough, was almoſt univerſal all over this iſland, for many ages. It is only within this century, indeed, that ploughing with horſes became common. In Scotland, in particular, it is little more than forty years, ſince the practice of uſing horſes only in the operations of huſbandry, was introduced.

The

The chief varieties of cattle in England, fall under one or other of the following denominations, *viz.*

The long-horned.
The middle-horned.
The ſhort-horned.
The Suffolk Duns,
and
The Welſh Cattle.

It is highly probable, the firſt of theſe breeds, viz. the long-horned, originated in importations of cattle from the neighbouring country of Ireland; and that bulls and cows brought from that iſland, having been coupled with the ancient breed of the diſtrict, produced the ſort of cattle known by the name of the Lancaſhire or long-horned, and which now occupies a large portion of the paſture-lands of England.

Beſides Lancaſhire, the long-horned cattle are alſo very general in the counties of Warwick, Leiceſter, Gloceſter, Cheſter, and ſeveral others of the midland counties; and what is ſurpriſing, and ſhews great attention in the one inſtance, and equal neglect in the other, this ſort of cattle are ſaid to be found in greater perfection in the county of Leiceſter, than in the diſtrict whence they take their name.

The Lancaſhire cattle are remarkable for the length of their horns and hair, and the thickneſs

neſs of their hides. In ſize they are ſuperior to the Suffolk Duns, but inferior to the ſhort and middle-horned. In reſpect to quantity of milk, not equal to the Suffolk breed, but ſuperior to the other two. In diſpoſition to fatten, excluſive of ſome individuals that are peculiarly well formed, they rank, ſo far as the writer has had acceſs to know, from his own experience and obſervation, or to be informed from reſpectable authority, lower than any other breed in Great Britain.

The middle-horned breed of cattle, are in poſſeſſion of the ſouth and ſouth-weſt parts of England, as Suſſex, Dorſet, Hants, Devon, *&c.* and have alſo got ſo far north as Herefordſhire, in which diſtrict the largeſt cattle of this ſort are to be found. It appears extremely probable, that theſe cattle are the deſcendants of thoſe which the Romans were in poſſeſſion of during their reſidence in the iſland. The original breed would no doubt be removed by the ancient Britons unto Wales, when they were forced to retreat into the faſtneſſes of that country, to avoid the invaders. Be that as it may, when all the properties which ſhould attach to a uſeful breed of cattle, are conſidered, the middle-horned may be ſaid, as a general variety, to come nearer to perfection than any other in England. They are of a large ſize, well formed, ſteady in harneſs or draught, and poſſeſs that exertion and

agility ſo neceſſary in a labouring ox. In diſpoſition to fatten, they are probably much on a par with the ſhort-horned, and greatly ſuperior to the Suffolk. As dairy-cattle, they are as valuable as any that fall under the deſcription of quick feeders; for although they give a leſs quantity of milk than the Suffolk or long-horned, it is ſaid to be of a richer quality.

The ſhort-horned cattle are chiefly to be found in Lincolnſhire, and the eaſtern parts of the counties of York, Durham, Northumberland, and Berwick. This breed, in conſequence of its having been originally imported from Holland, is called the Dutch, and ſometimes the Holderneſs breed, from a place of that name in Yorkſhire, where it would ſeem it was firſt eſtabliſhed in this country. They form a contraſt to the long-horned cattle in other particulars beſides their horns; they are larger and thicker in the mould or carcaſe, have very thin hides, and ſhort hair; they evince a diſpoſition to fatten quickly, and alſo afford a great quantity of tallow; properties which the Lancaſhire cattle poſſeſs in a very inferior degree. Deſtitute of the exertion and agility of the middle-horned ſort, they are not ſo well adapted for the cart or the plough. They are not remarkable for the quantity of milk; on the contrary, conſidering their ſize, and the quantity of food they devour, it is probable they are inferior to

any

any of the other ſorts above mentioned: When compared with the Suffolk Duns, greatly ſo. Some individuals, as Mr Bakewell, Mr Fowler, Mr Paget, &c. beſtowed much attention on the improvement of the long-horned breed of cattle. But it is probable, a greater number of eminent breeders have of late embarked in the laudable undertaking of improving the ſhort-horned breed; and from their knowledge, aſſiduity and attention, much may be expected. Mr Charles Collings at Kettens, near Darlington, is at preſent in poſſeſſion of the beſt breed of ſhort-horned cattle in England *; and his abilities and intelligence are fortunately ſuch, that his ſtock will, in all probability, long go on in a progreſſive courſe of improvement.

Whether the Suffolk cattle, which are all poled, are an accidental variety, picked up at ſome period or other, and for the ſingularity of colour (dun), bred from, or whether the breed was

* Mr Collings is in poſſeſſion of a cow, for which the writer heard him refuſe 150 guineas; and of a calf, for which he was alſo offered 60 guineas, when under three months old.

Theſe are incitements, that, when added to the ſatisfaction that muſt ariſe in the mind of a man of Mr Collings's character, from the reflection of having rendered an eſſential ſervice to his country, are more than ſufficient to induce him to perſevere in the path in which he has ſet out.

was originally imported from the Continent, the writer cannot undertake to determine. He rather ſuppoſes, however, from ſome circumſtances he was informed of a few years ago, when in that diſtrict, that the original breed was imported from the Continent. This deſcription of cattle are conſiderably ſmaller than any of the ſorts above mentioned. They are celebrated, and very juſtly, for the quantity of milk they give, which, from their ſize, from 45 to 50 ſtone (of 14 lb.), is greater than is given by any general breed of cows in either kingdom. Some individuals will yield ſeven or eight gallons in the day; but, what is much more extraordinary, a whole dairy of cows, ſuch at leaſt as are in milk, and to the number of thirty or forty, will give five gallons a-day, for two or three months together; that is, in the height of the graſs ſeaſon. The Suffolk cattle are not, however, a valuable breed: Their form is very plain; hence it is extremely difficult to fatten them; and although the quantity of milk which they yield is great, yet it is very thin, watery, and indifferent in quality *. They are therefore not only leſs valuable to the grazier

* This is not peculiar to the Suffolk cows; the ſame complaint holds againſt all deep milkers; and it is a very miſtaken idea to ſuppoſe, that all milk is of an equally rich quality.—Three gallons of ſome cows milk

zier and the butcher, but they give more trouble to the dairyman, whoſe returns in butter or cheeſe are leſs than, on ſimilar paſtures, a like number of cows of any other breed would produce.

In deſcribing the Welſh cattle, the writer has chiefly in view thoſe of Cardiganſhire, as he has had opportunities of ſeeing more of that ſort, than of any other bred in Wales. They are moſtly black, with thick horns, turned upwards. They are of a ſmall ſize, clean-boned, of a good ſhape, eſpecially where the native breed has not been injured, by injudicious croſſing with others from England. They are hardy and active; and are in great requeſt in the ſouthern counties of England, on account of their being quick feeders. The quantity of milk is trifling; but they are, upon the whole, a breed well adapted to that country, although ſtill capable of very great improvement; which might be effected with more certainty, and to a greater extent, by ſelecting the beſt individuals of the native breed, than by bringing others, poſſeſſing probably very different qualities, from England.

Excluſive of the ſhort-horned breed, which is common in the county of Berwick, and in the low

milk, will produce an equal quantity of butter or cheeſe, that five of many others will do, on the ſame paſture.—Of this more hereafter.

low part of Roxburghſhire, there are other three diſtinct varieties of cattle in Scotland; as

The Low-Country Cattle;
The Highland Cattle;
and
The Galloway Cattle.

The Low-Country cattle, are thoſe in the counties along the eaſtern coaſts, from Berwick to Nairn; and including alſo thoſe in the diſtricts ſituated on both ſides of the Forth and the Tay. The cattle ſent from this extenſive diſtrict into England, are all denominated Fifeſhires, or Fifeſhire *runts*. They are no doubt what this term imports, "dwarf animals," compared with the general run of the large cattle in England; but what is worſe, they are a croſs-mixed, coarſe breed; inſomuch that, except in the county of Fife, there is ſcarcely a diſtinct variety diſcernible. The general introduction of two-horſe ploughs, put a ſtop to the laudable emulation for keeping fine oxen, that prevailed before that period. The farmers became careleſs about the breed of cattle; and a mixture of breeds was the conſequence, the croſſes not having been conducted with judgment, but rather taking place as the chapter of accidents directed. Symmetry of form, ſize, ſtrength, and almoſt every good property, are ſo much im-

paired or leſſened, that it will require a long period, and much attention, to bring the breed of cattle in theſe diſtricts, to the ſame degree of perfection at which it had arrived thirty years ago. Such, however, are the conſequences that may always be expected to reſult from a general inattention to the breeds of live ſtock. It is with regret the writer feels himſelf obliged to make ſuch a ſtatement, in regard to the breed of cattle in his native country; but truth demands it. There are ſome individuals, it is true, who have beſtowed conſiderable attention on this important branch of rural economy; but the number is very ſmall; and while the Engliſh farmers, and thoſe in Berwickſhire, are exerting every nerve, to rival one another in the beſt breeds of live-ſtock, there is a ſupineneſs, a negligence, reigns among even the moſt intelligent farmers in the other parts of Scotland, that is truly ſurpriſing.

As you recede from the level and better cultivated parts of the country, and approach the mountainous diſtricts, you leave this motley breed of cattle, and fall in with another, which, although ſmaller in ſize, is pure and unmixed: The Highland cattle are known in England by the name of *Kylaes*; (probably from a diſtrict in Ayrſhire, called Kyle, where that ſort of cattle prevail,) and are highly eſteemed by the graziers in that country, for their diſpoſition to fatten. This

ſort

ſort of cattle are common in the highland parts of the counties of Dumbarton, Stirling, Perth, Aberdeen, Banff, and Moray, and in Argyle, Inverneſs, and all the northern diſtricts. They are very hardy, well-ſhaped; and their beef is ſo ſuperior to that of the large Engliſh cattle, that it always ſells at a higher price *. The Iſle of Sky cattle are the ſmalleſt in ſize, but the moſt perfect in every other reſpect, not only of the Kyloe ſort, but of any in the Britiſh dominions. This aſſertion is not founded on the writer's own particular knowledge or judgment, but on the authority of the beſt judge of his time,—the late Mr Bakewell, whom he has heard repeatedly declare his ſentiments on the ſubject, and to that effect. If it ſhould be aſked, how it happens that the cattle in the moſt remote, and, it may almoſt be added, the leaſt cultivated part of Great Britain, ſhould poſſeſs a greater ſhare of the properties which conſtitute what may be denominated a perfect breed, than any of thoſe in the more fertile parts of the country, the anſwer appears eaſy:—The breed in the Iſle of Sky is the original breed of the diſtrict,

* The waiters, at ſome of the country inns in England, when a traveller aſks them for a bill of fare, frequently informs him, that he can have ſome Kyloe beef, which they conſider as a great feaſt.

ſtrict, pure, and unmixed with any other*; whereas, not only in that part of Scotland above mentioned, but everywhere in the cultivated parts of Great Britain, croſs breeds have by degrees crept in, and maimed the original breed ſo much, that, even in a country where a particular breed predominates, there will be found endleſs varieties.

The Iſle of Sky cattle, having been pronounced by ſo reſpectable authority, to be upon the whole ſuperior to any other in Great Britain, and greatly deficient only in one particular, "ſize," it is certainly an object of national importance, to endeavour, if practicable, to remove this obſtacle to the more general eſtabliſhment of the breed. This can be beſt effected, under the judicious management of an expert Engliſh breeder: Were a Honeyborne †, a Culley, or a Collings, to undertake the taſk, if the experiment proved ſucceſsful, of which there is little reaſon to entertain a doubt, it would go a great way to eſtabliſh a moſt important point; namely, what, in a great national point of view, is the beſt breed of cattle.

The

* This is a ſtrong argument in favour of Mr Bakewell's opinion, that breeding from the ſame ſtock, is much better than croſſing one breed, or rather one variety of the ſame breed, with another.

† Mr Bakewell's nephew and ſucceſſor.

The only other diſtinct variety of cattle in Scotland, are thoſe bred in Galloway, and which in England are denominated Galloway-poles. They are of a ſhort compact form, in ſize ſomewhat above the Suffolk cattle. They are not ſo deep milkers as them, but the quality is much ſuperior. In the liſt of cattle that poſſeſs a diſpoſition to fatten, they ſtand high; and, what is not leſs in their favour, they not only lay their fat upon thoſe parts of the body that ſell higheſt at market, but the whole carcaſe when cut up, has alſo a marbly appearance, being everywhere mixed with fat. This valuable breed is not ſo numerous, nor ſo pure, as formerly. Attempts at farther improvement, conducted too often without judgment, and frequently without having any determinate object in view, have been the means of introducing many croſs breeds, a circumſtance which has tended materially to injure the parent ſtock. The Galloway breed of cattle is not confined to the diſtrict of that name. This ſort of cattle are to be found in conſiderable numbers in Dumfries and Ayr ſhires, eſpecially towards the borders of Galloway and Kirkcudbright. More remote from theſe laſt mentioned diſtricts, that is, in the north diviſion of the county of Ayr, the eaſtern part of Dumfries-ſhire, and in the counties of Lanark, Peebles, Selkirk, &c. the breeds of cattle are conſiderably mixed. They are, however, in general, of the Kyler ſort,

with croſſes from the Galloway, the long-horned from Cumberland and Weſtmoreland, and from the different varieties in the low parts of Scotland.

From the above general deſcription of the Britiſh cattle, it will naturally occur, that all the ſorts taken notice of, are not equally profitable to the breeder, the rearer, the dairyman, the grazier, the butcher, or the conſumer. Some have a greater diſpoſition to fatten than others. Some being cleaner boned and better formed, have leſs offal. Some give a greater quantity of milk than others. In a word; ſome of the particular properties for which cattle are eſtimable, are more diſcernible in one breed than in another. Whether theſe can be all united in the ſame animal, or whether a breed of cattle poſſeſſing all the requiſite qualifications, would be equally ſuitable to all ſituations, are queſtions not eaſy to be determined.

In regard to the firſt, it ſeems univerſally agreed, that there are two properties for which cattle are eſteemed valuable, that cannot be united; that is, a diſpoſition to fatten, and a tendency to yeild a large quantity of milk. The form of the animal moſt remarkable for the firſt, is very different from that of the other; in place of being flat in the ſides, and big in the belly, as all great milkers are, it is high-ſided and light-bellied. In a word, its body is barrel-formed,

while

while that of the other is more fitted to embrace a horſe collar, with the wide ſide downwards. It is not probable, therefore, that the properties of two breeds of cattle, ſo oppoſite in form and general appearance, can ever be united in the ſame animal. If a large quantity of milk, whatever be its quality, is the object, the dairyman muſt content himſelf with ſuch plain ill-looking animals as above deſcribed.

It was formerly hinted, that the milk of all cows was not of the ſame quality. This is an incontrovertible fact, in ſo far as the quantity of butter, or of cheeſe, that can be extracted, is a proper criterion by which to judge. The richneſs of milk, no doubt, depends in a very conſiderable degree, on the age and quality of the paſture, but more on the nature and conſtitution of the animal; and although the fact, it is believed, has not been aſcertained by any accurate well authenticated experiments; yet, it appears highly probable, that in proportion as the cows of the milking tribe exceed thoſe that are more diſpoſed to fatten in quantity, in nearly the ſame proportion will their milk be inferior in quality *. If this ſhould prove to be the caſe, the ſuperiority of the quick feeders, one would ſuppoſe to be completely eſtabliſhed; as, while cattle of this deſcription, are confeſſedly better for the purpoſes of the graziers, the butchers, and the conſumers, they would, if this point were

* See next chapter.

were determined in their favour, be alſo more valuable for the dairy. No perſon will think of aſſerting, that a gallon or two of whey, or of butter-milk extra, (for the queſtion comes to that), is a ſufficient reaſon for preferring a breed of plain-looking, ill-formed cattle, to one that, except in this particular, is more valuable in every reſpect. In a word, no perſon, who pretends to a knowledge of the different breeds of cattle, will think of ſupporting an opinion ſo erroneous, as, that cattle which are diſpoſed to fatten quickly, and at an early age; that from the ſuperior excellence of their form, have a ſmall proportion of offal, or what the breeders call non-eſſentials; and that although they yeild not a large quantity of milk, yet make up for that deficiency in the richneſs of its quality; are not more valuable than thoſe which have nothing to recommend them, but the ſingle property of being great milkers. The Suffolk cows are known to be a diſtinct variety from any other breed in this country. Except from the circumſtance of its being generally known, that unleſs in reſpect to giving a larger quantity of milk, they are inferior to every other ſort; it is difficult to account for this breed of cattle having been confined for ages within ſo narrow a circle, as a part of a moderate fized county: Were it not for the numerous bad properties which they are known to poſſeſs, that one good feature in their

character,

character, and for which they are greatly celebrated, would have long ſince been the means of ſpreading the breed through every dairy diſtrict in England.

Mr Young informs us, in his Agricultural Report of Suffolk, that the quality of milk which the cows in that diſtrict yield, is *more extraordinary than that of the butter*; this, in ſo far, corroborates the preceding ſtatement. There are certainly ſome attentive breeders in that diſtrict, although by his account, the number is not conſiderable. It would be extremely deſirable to aſcertain, and no man is better qualified for the taſk than Mr Young, whether, in ſuch inſtances, as have occurred, where improvements have been made on the breed of Suffolk cattle, in regard to figure and bone, by croſſing with other breeds, a decreaſe in the quantity of milk was not always the conſequence? Further, Whether, as this croſs breed aſſumed more of the figure of a quick feeder, the milk did not become richer in quality; or, in other words, yield more butter in proportion? and, laſtly, What diminution in the quantity of butter, or of cheeſe, if any be ſuppoſed to take place in conſequence of the quantity of milk being reduced by the improvement that takes place in the form of the animal? A ſolution of theſe queſtions, as they would in all probability turn out to be againſt the breed of great milkers, might have a good

effect in convincing the public of the inferiority of this breed, compared with the other; and of the propriety of devoting the chief attention to the improvement of that, which, from a concurrence of ſuch circumſtances as above ſtated, ſhall be proved the moſt valuable.

Whoever peruſes the Agricultural Reports of the various counties of theſe kingdoms, made to the Board of Agriculture, will be aſtoniſhed to find in how few diſtricts attention is paid to the improvement of any ſpecies of live-ſtock; to find in how large a portion of Great Britain the domeſtic animals, particularly the cattle, are, as the honeſt Cumbrian ſaid to Meſſrs Culley and Bailey, when ſurveying that county, '*Sik* '*as God ſet upon the land*;' or, in other words, the ancient breed of the country, handed down from generation to generation, and without any means having been adopted for improving them, either in ſize, ſhape, or value: '*Lord, Sir*,' added the ſame man, '*we never change any*.' It would have been fortunate had the farmers, on the low parts of Scotland, adopted the ſame rule: becauſe although the breed of cattle, in that caſe, might not have been much improved, as it is only of late years that the farmers in that part of Great Britain, acquired any correct ideas in regard to the breeding branch of huſbandry; yet an endleſs confuſion of improper and injudicious croſſes would have been avoided, which, in all probability,

bability will mark the character of that country cattle for a long period yet to come. There is ſcarcely any perſon, who is poſſeſſed of cattle, that does not know that there are marks or rules by which to judge of a good bull; but the number who can determine with preciſion what theſe are, is inconſiderable. For the information of ſuch, Mr Culley's deſcription of a bull is here ſubjoined.

"The head of the bull ſhould be rather long, "and muzzle fine; his eyes lively and promi- "nent; his ears long and thin; his horns white; "his neck riſing with a gentle curve from his "ſhoulders, and ſmall and fine where it joins "the head; his ſhoulders moderately broad at "the top, joining full to his chin and cheſt back- "wards, and to the neck vein forwards; his bo- "ſom open; breaſt broad, and projecting well "before his legs; his arms or fore-thighs muſ- "cular, and tapering to his knee; his legs "ſtraight, clean, and very fine boned; his cline "and cheſt ſo full as to leave no hollows behind "the ſhoulders; the plates ſtrong, to keep his "belly from ſinking below the level of his "breaſt; his back or loin, broad, ſtraight and "flat; his ribs riſing one above another, in "ſuch a manner as the laſt rib ſhall be rather "the higheſt, leaving only a ſmall ſpace to the "hips or hooks, the whole forming a round, or "barrel-like carcaſe; his hips ſhould be wide

"placed, round or globular, and a little higher "than the back; the quarters, from the hip to "the rump, long, and inſtead of being ſquare, "as recommended by ſome, they ſhould taper "gradually from the hips backward, and the "curle or pot-bones not in the leaſt protuberant; "rumps cloſe to the tail; the tail broad, well "haired, and ſet on ſo high as to be in the ſame "horizontal line with the back."

When a proper ſelection is made of a ſtock whence to breed from, the cow is choſen in conſequence of poſſeſſing the following properties: A proper ſize and conſtitution, according to the paſture and climate; her body being long; her belly round and large; and her udder white, ſoft, and not fleſhy. Her being of the ſame colour with the bull, is alſo a circumſtance that is conſidered as meriting attention.

Cows are frequently allowed to take the bull at two years old; but as they are not at that time arrived at their greateſt ſtrength or ſtature, it is more adviſable to refer it till they are three years old. A cow goes nine months, and drops her calf, when in the regular ſeaſon, from the beginning of March till the end of May. During her pregnancy ſhe requires very little attention beyond what is neceſſary at other times. The moſt material circumſtances to be attended to, are, to prevent her from leaping over ditches, hedges, &c. and to avoid frightening her, or giving

her

her too violent exercise. At the time of the birth, nature does its part, and the interposition of art is rarely necessary, except in the case of the short-horned or Holderness breed, which seldom calve without assistance.

The treatment of calves, whether rearing or breeding be the object, is very different in different districts. Some of the methods adopted in both cases shall be described.

The method generally adopted of fattening calves, is to allow them to suckle. By this means, the object is not only sooner, but more effectually attained than by any other. The usual period deemed necessary for fattening a calf, is from seven to nine weeks; but in the dairy-districts, where milk is considered a valuable article, scarcely half that time is allowed. The only other usual method is to give them milk to drink; when that is done, the milk is given them morning and evening warm from the cow, and the quantity increased according to their age and strength. In either case they are kept in pens in a close house, and well littered. Sometimes a lump of chalk is laid in a trough, within their reach, by the licking of which it is supposed their flesh acquires a whiteness; a property which all connoisseurs in veal greatly admire. The veal-feeders are also in the practice of blooding their calves repeatedly in the course of fattening; this is done for the same reason last mentioned; but

but, although it may no doubt tend to give the veal a whiteneſs, which it would not otherwiſe be poſſeſſed of, yet it muſt certainly render it leſs nouriſhing. In ſeveral parts of England, barley-meal, lintſeed, boiled into a kind of jelly, &c. are given to calves, in the courſe of fattening; but either of the methods above deſcribed are greatly ſuperior, although, it muſt be allowed, conſiderably more expenſive.

The uſual method of rearing calves in Yorkſhire, is by giving them milk to drink, there being few inſtances where they are allowed to ſuckle. For the firſt two or three weeks, they get milk warm from the cow; for the next two or three weeks, half the new milk is withdrawn, and ſkimmed milk ſubſtituted in its ſtead; at the end of that period, new milk is wholly withdrawn; and they are fed on ſkimmed milk alone, or ſometimes mixed with water, till they be able to ſupport themſelves by eating graſs or other food.

The practice in Cheſhire, is to allow the calves to ſuckle for the firſt three weeks. They are afterwards fed on warm green whey, or ſcalded whey and butter-milk mixed; with the green whey, water is frequently mixed, and either oat-meal, or wheat and bean flour, is added. A quart of meal or flour is thought ſufficient to mix with forty or fifty quarts of liquid. Oat-meal gruel and butter-milk, with an addition of ſkimmed milk,

are

are alſo uſed for the ſame purpoſe. Some one of theſe foods is given night and morning for a few weeks after the calves are put on that diet, but afterwards only once a-day, till they are about three months old.

In Glouceſter-ſhire, the calves are not allowed to ſuckle above two or three days; they are then fed on ſkimmed milk, which is previouſly heated over the fire. When they arrive at ſuch an age as to be able to eat a little, they are allowed ſplit beans or oats, and cut hay, and water is mixed with the milk.

The method practiſed in Suſſex is materially different from any of theſe above mentioned. There it is common to allow the calves, either to ſuckle for ten or twelve weeks, or to wean them at the end of three or four, and to give them a liberal allowance of ſkimmed milk for ſix or eight weeks longer.

The farmers in Scotland, although almoſt a century behind thoſe in England as to the neceſſary attention in the ſelection of the beſt ſorts of live ſtock, are entitled to praiſe in regard to their management of calves, when it is compared with any of the methods above mentioned. There are two ways in which calves are uſually reared in that kingdom. The firſt is, by giving them a pailful, containing about a gallon of milk, warm from the teat, morning and evening, for 8 or 10 weeks. The ſecond, which being

being agreeable to nature's rules, is preferable to any other that can be adopted, is to allow the calf to ſuckle its dam, as is ſometimes done in the county of Suſſex.

Calves, when dropt during the graſs-ſeaſon, ſhould be put into ſome ſmall home cloſe of ſweet rich paſture, after that they are eight or ten days old, not only for the ſake of exerciſe, but alſo that they may the ſooner take to the eating of graſs. When they happen to be dropt during winter, or before the return of the graſs-ſeaſon, a little ſhort ſoft hay or ſtraw, or ſliced turnips, ſhould be laid in the trough or ſtall before them.

The method of managing calves during the firſt winter is pretty generally the ſame in every part of the iſland. They are always houſed. Sometimes they are bound up to the ſtall; but more frequently allowed to remain at freedom. Their food in England, chiefly hay; in Scotland, ſometimes hay, but more frequently ſtraw and turnips. They are turned out on ſome of the inferior paſtures on the farm the following ſummer, and maintained the ſecond winter on ſtraw in the ſtraw-yard, or in houſes or ſheds erected for the purpoſe. Some farmers in Scotland, who, from being ſituated at a diſtance from any market at which they can diſpoſe of ſtall fed beef, very frequently give a conſiderable part of their turnip-crop to their young cattle.

This

This is an excellent practice; and one that ought to be followed, even by thoſe, who, from being better ſituated in regard to markets, can adopt other methods of uſing turnips to advantage. The benefit of green winter food for live ſtock of all deſcriptions has already been pointed out. It is, therefore, only neceſſary now to add, that there is probably no way in which turnips can be uſed, by which the farm or the farmer would reap greater benefit, than by giving the young cattle a daily allowance during the firſt two or three winters.

There is little variation in the management of young cattle from that above deſcribed, during the time they remain in the breeder's poſſeſſion, which is longer or ſhorter, according as circumſtances occur.

In ſome diſtricts, it is the uſual practice, as was formerly obſerved, to allow the young heifers to take the bull at two years old; in which caſe, what are not neceſſary for keeping up the ſtock, are diſpoſed of the following ſpring, before they drop their calves.

In ſome places, where the practice of ploughing with oxen is continued, or has been a ſecond time introduced, young oxen are broken into work in the courſe of the ſecond ſummer; this, however, is by no means common. Probably nine-tenths of the cattle reared in Great Britain, remain in the breeder's poſſeſſion till the

ſpring of the third year. The young cows are then diſpoſed of to the dairy-farmers, who often do not breed a ſufficient number to ſupply themſelves, or to the cottagers, who have the means of keeping a cow in ſummer, but not in winter. The young oxen are ſold, either for the purpoſe of ſupplying the ox teams, where theſe are ſtill kept; or to the graziers, who ſometimes fatten them for the butcher in the courſe of the graſs-ſeaſon, but more frequently content themſelves with only putting them in condition to be ſtall-fed during the following winter. The premature age at which ſuch cattle as are not employed in the operations of huſbandry, are now fattened, is a poſitive evidence of the ſcarcity of that ſpecies of live ſtock, which is ſo generally ſaid to prevail. Excluſive of the cattle uſed in the plough or the cart, which are permitted to live a year or two longer, the oxen in this country are in general killed before they are four years old, an age, at which it is well known, an ox does not fatten to the greateſt advantage. Whether the ſcarcity of cattle ariſes from the increaſe of luxury among the middle and lowet claſſes of people; or, that the rearing of this ſpecies of ſtock is not now ſo much an object of the farmer's attention, the writer will not pretend to determine. It is probably not owing entirely to one or both of theſe cauſes, but to a combination of theſe with ſeveral others. That it does exiſt, however,

however, is evident, not from the preſent extorbitant price, which can be eaſily accounted for, but from the rapid and regular riſe that has taken place in the price of cattle for ſeveral years. The ſcarcity of cattle is an evil of a moſt ſerious nature; and, as it is increaſing every year, merits perhaps more than any other ſingle object the due conſideration of the Members of the Board of Agriculture.

The various ſorts of food with which cattle are fattened in theſe kingdoms, may be reduced under four heads, as graſs, turnips, grains, and waſh from the diſtilleries, and, laſtly, oil-cake, corn, cut-chaff, &c.

Fattening cattle are uſually put to graſs in May or June, according to the ſeaſon and ſituation in regard to climate. The period neceſſary for fitting an ox for the butcher depends on ſeveral circumſtances, as the condition he was in when put to graſs, the nature of the paſture, and many others; but in ordinary caſes, an ox will be completely fattened in three months.

There is one method of fattening, connected with the grazing ſyſtem, that the farmers in England are enabled, from the ſuperior excellence of the climate, to adopt with ſucceſs, which can never be attempted with propriety in Scotland. It is very common, at the cloſe of the graſs-ſeaſon, when the fattening ſtock happen not to be fully in condition for the butchers, to render

render them fo, by giving them hay two or three times a-day in the field, or in hovels erected for the purpoſe, into which they have acceſs at pleaſure.

When deſcribing the modes of culture commonly adopted for raiſing crops of turnips, the uſes to which they were applied were alſo mentioned. Therefore, all that is neceſſary further to ſtate on the ſubject of fattening cattle on that root, is, that when put up to the ſtalls in proper condition, which, conſidering the ſeaſon of the year, (November), muſt, with ordinary attention, always be the caſe, from ten to thirteen weeks is fully ſufficient to render them fit for market.

The fattening of cattle with grains may rather be conſidered as a branch of the diſtillery buſineſs, than as connected with huſbandry. There are, however, ſome inſtances wherein thoſe who cultivate farms, practiſe this mode of fattening with a double view;—profit on the ſale of the cattle, and the acquiſition of a valuable treaſure of uſeful manure. William Adam, Eſq; who rents the farm of Mount Nod, near Streatham, in the county of Surry, has erected the moſt complete building the writer ever ſaw, for the purpoſe chiefly of fattening cattle on grains. In this building may ſometimes be ſeen ſeveral hundred cattle. A detail of the management could not tend to general information: Suffice it to ſay, that the whole is conducted in a ſtyle,

that

that evinces the man of genius, and the attentive farmer.

The only other method of fattening cattle, that remains to be taken notice of, is that of using oil-cake, corn, cut chaff, &c. This method is practiſed in many of the Engliſh counties; and, from every thing the writer could learn, with ſucceſs ſufficient to warrant farmers in other parts of the iſland to follow the ſame practice. The cattle are commonly put up to fatten at the end of the graſs ſeaſon. The uſual allowance of oil-cake, after it is broken in a large mortar, or, in the fruit diſtricts, in a cyder mill, is about half a peck *per* day, which is given, one-half in the morning, and the other in the evening, to which is added hay, and in ſome caſes ground corn, that is, oats or barley of inferior quality, and cut ſtraw provincially "chaff." As bullocks fattened in this manner, get regularly five, and ſometimes ſix meals a-day, it is ſufficiently evident, that, although it may be upon the whole an expenſive mode of fattening, yet it muſt be both expeditious and effectual.

Although, conſidering the early period at which the cattle of this country are generally ſlaughtered, it is not now of ſo much importance to lay down rules, whereby to aſcertain their age with preciſion, yet, in many caſes, it muſt prove uſeful. The age of cattle, like that of horſes, is diſcernible by their teeth. They loſe

the firſt fore teeth at the age of ten or eleven months: Theſe are replaced by others of a larger ſize; and when about a year and a half old, the teeth next to thoſe in the middle drop out. Theſe are alſo replaced by others; and at the age of three years, the others are renewed in like manner. They then appear white, even, and regular, and pretty long, becoming gradually black, unequal, and ſhort, as the animal advances in age. Another mark, by which to determine the age of cattle, is the appearance of the horn. Cattle ſhed their horns at the end of three years; and towards the root of the ſecond ſet of horns, there is a kind of ring or joint, formed every year that the animal lives afterwards: So that, reckoning three years for the top, or plain part of the horn, and one for every interval between the rings or joints, the moſt ignorant perſon may, with conſiderable certainty, aſcertain the age of any ox or cow that has horns.

The number of cattle ſent annually from Scotland and Wales into England, is immenſe, and may be conſidered as conſtituting the chief mean, by which the balance of trade with that kingdom, is kept in any degree of equilibrium. The cattle are purchaſed at the provincial fairs, by people who make dealing in cattle a profeſſion or trade. Many of theſe people are reſpectable, as poſſeſſing not only property, but alſo intelligence,

telligence, probity, and honour; but in the liſt ſome may be found, who, from their conduct, would ſeem to have received their education at the horſe jockey ſchool.

In the low parts of Scotland, and in thoſe diſtricts of Wales adjacent to England, the cattle are ſold for ready money, and the price actually paid at the delivery. A dealer in cattle, who, in theſe diſtricts, ſhould aſk credit till his return from England, would be conſidered as in very doubtful circumſtances. The trade is, however, carried on in a very different manner, not only in the remote parts of Wales, but alſo in the counties of Galloway, Argyle, Inverneſs, Roſs, Sutherland, Caithneſs, Orkney, *&c.* There the drovers in general agree as to the price, when they receive the cattle; but the payment is deferred till their return from the ſouth country markets, and is then made in whole, or in part, as they chooſe to find convenient. The loſſes and hardſhips, which the cattle-breeders in theſe diſtricts ſuſtain, are deſcribed in the following words, in the Report of the Iſland of Angleſey, in North Wales. "The practice of giving cre-
"dit to the Engliſh drovers who purchaſe the
"cattle, is very general through all North
"Wales; by which means, the farmer ſeldom
"gets the money he bargains for; for when the
"drover returns, perhaps in a month or two, he
"always pretends to have made a bad bargain,
"or

" or has met with a dull market for the cattle;
" for which reaſon, a diſcount muſt be allowed.
" But what is worſe, ſome of them become in-
" ſolvent, or pretend ſo; by which means, the
" induſtrious farmers are greatly hurt, and in
" ſome caſes totally ruined."

It is truly ſurpriſing, that the proprietors of theſe diſtricts do not ſtep forward at once, and put a ſtop to ſo nefarious a practice, which they muſt be fully ſenſible, is attended with the moſt direful conſequences to many individuals whom Providence has placed under their peculiar protection.

The conduct of the proprietors of the Carſe of Gowrie, a few years ago, on an occaſion nearly ſimilar, while it deſerves praiſe, alſo merits imitation. Grain is the great article of produce in that fertile tract. It had been for many years the practice, for the farmers to ſell their ſurplus grain on credit to the corn-merchants who reſided either in the diſtrict, or in the neighbouring towns. Some of theſe having failed for very conſiderable ſums, and the evil continuing to increaſe, the proprietors concerted among themſelves; and having called a meeting of their principal tenants, which was fully attended, reſolutions were entered into, the import of which were, that in future, all grain was not only to be ſold for ready money, but that the price ſhould actually be paid on delivery.

Theſe

Theſe having been publiſhed, had at once the effect of eſtabliſhing the corn-trade of that diſtrict on a proper footing. Were the ſame remedy applied to the cure of the evil that now exiſts in the cattle-trade; and nothing ſurely can be more ſimple, conſequences equally beneficial would enſue. Proprietors would be more certain of receiving their rents; and the peace, comfort, and well-being, of many an honeſt induſtrious farmer's family, remain undiſturbed.

Although horſes are now chiefly employed, yet it is evident, that in former times, the operation of ploughing was performed in almoſt every part of theſe kingdoms with oxen. In regard to the propriety of this ſo general a change, or the advantages of the one practice over the other, the writer means to offer no deciſive opinion. The ſubject appears to him to be exhauſted. Every modern writer on huſbandry, has had it under conſideration; and, beſides uſing every argument that ingenuity could deviſe, in order to evince that oxen are in every reſpect ſuperior to horſes, many of them have alſo publiſhed hypothetical tables to prove that their reaſoning was well founded. On the other hand, a few individuals only, in the claſs of practical farmers, have aſſented to the juſtice of the reaſons aſſigned, or to the correctneſs of the calculations exhibited, in ſo far as to have adopted the alteration propoſed. Whether it be

owing to the circumſtance of the demand for fattening cattle having increaſed to ſuch a degree, that the ſupply that can by any means be furniſhed, is inſufficient; or, that horſes, by their ſpirit and activity, poſſeſs a real ſuperiority over cattle, in draught; or whether owing to a combination of theſe with other circumſtances; certain it is, that the number of cattle employed in the plough is every year decreaſing, while that of horſes is rapidly increaſing.

SEC.

SECTION III.

Sheep.

We are now to enter on a ſubject of the greateſt national importance, the breeding, rearing, and managing of ſheep. "Sheep," ſay the Swedes, "have golden feet, and wherever they "ſet them, the earth becomes gold:"—A ſtrong figurative expreſſion, by which they denote the high eſteem in which they hold this animal. The proper management of ſheep, whether the proſperity of agriculture, the advancement of manufactures, or the ſupply of proviſion for the inhabitants, be ſingly conſidered, will be agreed by all, to be a moſt intereſting particular in rural economy; when theſe are regarded in conjunction, there is no other of the domeſticated animals, whence mankind derive ſo much benefit. Their fleſh, wool, ſuet, milk, ſkin, dung; in a word, almoſt every part of them is applied to uſeful and profitable purpoſes. In an agricultural view, the benefit derived from folding ſheep on turnip-lands and other light ſoils, is highly rated in many parts of England. Mutton is univerſally and juſtly eſteemed as a moſt valuable

valuable article of proviſion. With reſpect to manufactures, it is well known, that wool is the ſtaple commodity of theſe kingdoms; it furniſhes employment for a very large portion of the inhabitants at home; is the means of extending our commerce abroad; and on the whole, forms a greater ſource of riches to the nation, than any other article of which it is poſſeſſed.

This valuable animal poſſeſſes a remarkably quiet inoffenſive diſpoſition, and is at the ſame time the moſt defenceleſs of all others. Sheep are eaſily frightened, and are peculiarly fond of ſociety; few inſtances occurring, except among the mountain-breed, which is more inclined to rove and ſtray, where a ſheep in good health is found ſeparated at any conſiderable diſtance from the flock.

There is no country in Europe, perhaps in the world, that is, upon the whole, better adapted to ſheep-huſbandry than Great Britain, particularly the ſouthern and more fertile parts of the iſland. There, an almoſt perpetual verdure appears. The froſts and ſnows and ſeverities of winter, are of ſhort continuance; while in ſummer the air is temperate, and rich and nutritive paſtures everywhere abound. No wolves, tigers, nor other ravenous beaſts, diſturb the flocks; nor do thoſe inſects and reptiles ſo common in warm climates, prove in this, in any material degree, injurious to theſe defenceleſs animals.

All

All the various ſorts of ſheep in Europe, according to M. de Buffon, are of the ſame ſpecies, although, as may be obſerved in the flocks in Great Britain, very greatly diverſified. Dr Campbell is of opinion, that ſheep were firſt imported into this iſland from Spain. "It cannot be doubted," he ſays, "that as the inhabitants of Britain and "Ireland, ſo the ſheep alſo, came originally hi-"ther from ſome other country, and moſt pro-"bably, for many reaſons that might be aſſign-"ed, from Spain." This ſeems confirmed by the breed being the ſame in both iſlands, and having a great reſemblance to the Spaniſh ſheep*.

From whatever quarter ſheep were firſt brought into Britain, certain it is, that in ancient times wool was in great abundance, and not only the chief article of foreign commerce, but alſo the means by which domeſtic traffic was carried on. The ſame author, Dr Campbell, in the account he gives of ſheep and wool in former times, (Vol. II. p. 152.) remarks, that "the wealth of "the nobility, gentry and monaſteries, conſiſted "chiefly in wool, which alſo then made the "bulk of private property at home. It was, at "the ſame time, the prime article in commerce. "Aids to the Crown were granted therein. It "ſupplied the demands for the ſupport of ar-"mies, the payment of ſubſidies, and all other "expences

* Campbell's Political Survey of Great Britain, Vol. ii. p. 160.

" expences incurred on account of the public " in foreign parts."

Wool having been an article of ſo great conſequence, even in the infant ſtate of manufactures and commerce in England, was probably the reaſon that induced Edward IV. to apply to the then King of Caſtile, for ſome of the Spaniſh breed of ſheep, which had about that time been much improved by tups brought from Barbary. This requeſt having been complied with, and theſe tups having been coupled with the beſt ewes of the country, or original breed, produced a race greatly ſuperior, both in carcaſe and wool, to the native ſort. By this means was laid the foundation of that improvement in the quality of the wool, and the ſhape of the animal, which was afterwards, by the care and attention of ſucceeding Sovereigns, to a conſiderable degree effected.

In Queen Elizabeth's time, the attention of Government ſeems to have been directed to the ſame great national object. Many very proper regulations were made, and men of reſpectability and judgment ſpecially appointed to ſuperintend this important branch of huſbandry. Shepherds were not only regularly inſtructed in the art of managing flocks of ſheep, but were alſo furniſhed with written directions. Many other laudable means were alſo uſed to give ef-

fect to the meaſures which the executive government ſuggeſted as neceſſary to be adopted.

By importing, from time to time, the beſt breeds of Spain, and by adhering ſteadily to the rules and regulations above alluded to, conſiderable improvements were no doubt effected; but to what extent cannot now be aſcertained. The ſucceeding Sovereigns having ſlackened in their attention, the breeds of ſheep, and the quality of the wool, became gradually debaſed, and as this was the caſe for a long period, it is eaſy to account for the degenerate ſtate to which the Britiſh wool had arrived, and for the loud and reiterated complaints made by the manufacturers of the preſent age. Their complaints induced many ſenſible people to write on the ſubject; but their ſuggeſtions were in general little attended to. Fortunately for Great Britain, it poſſeſſed one individual at leaſt, (the late Mr Bakewell), who, duly weighing the magnitude and importance of the object, devoted a long life to its attainment. How far he was ſucceſsful in his endeavours ſhall be taken notice of in the ſequel. Suffice it, for the preſent, to ſay, that to him, and to him alone, it is owing that ſo general a ſpirit for improving the breed of ſheep now exiſts: A ſpirit ſo great, that if it be not checked by ſome unforeſeen diſaſtrous event, muſt neceſſarily be the means of raiſing this animal in uſefulneſs and value to the farmer, the manufacturer,

facturer, and the conſumer, beyond what it ever was at any former period.

The different breeds, or rather varieties, of ſheep in Great Britain, may be ranged into three general diviſions, beginning with that, which, as being the moſt ancient, rather than for its ſuperior excellence, claims the firſt place, namely,

The Mountain Breed;
The Short-woolled Breed;
and,
The Long-woolled Breed.

The mountain-ſheep conſiſt of ſeveral varieties; as, The black-faced, which range on the mountains of Wales, Weſtmoreland, Cumberland, Yorkſhire, and on thoſe in the ſouth, weſt, and north of Scotland: The Cheviot breed, which is chiefly confined to the hills of that name, in the north of England, and ſouth of Scotland: The foreſt ſheep, that paſture on the foreſts and commons in the former kingdom: The Daniſh breed, which is to be found along the bottom of the Grampian mountains, adjoining to the better cultivated parts of the low country, and in ſome parts of the north of Scotland: and, laſtly, The Shetland breed. The particulars in which theſe differ from each other, may be aſcertained by reviewing the agricultural deſcriptions of the counties of Peebles, Roxburgh, Warwick, Elgin, and Orkney.

The

The ſhort-woolled ſheep, beſides thoſe of Shetland and the Cheviot-hills, are chiefly to be found in the counties of Hereford, Dorſet, Suſſex, Norfolk, and ſome parts of Cumberland, and are particularly taken notice of in the account already given of the live-ſtock in theſe reſpective diſtricts.

The only other diſtinct variety, that is the long-woolled ſheep, are ſpread over all the moſt fertile parts of England. They, are, however, diſtinguiſhed by the names of the Durham or Tees-water, the Lincolnſhire, and the old and new Leiceſterſhire; and the reader has only to refer to the preceding deſcription of theſe reſpective counties for the particulars in which theſe breeds differ from each other. In order further to aſſiſt him to form a correct idea as to the comparative merits and value of all theſe various breeds, a Synopſis, or General View, of the different Breeds of Sheep in Great Britain, borrowed, by permiſſion, from Mr Culley's valuable Treatiſe on Live-ſtock, is here annexed.

A SYNOPSIS,

Or GENERAL VIEW, of the different BREEDS of SHEEP in Great Britain. Taken, by Permiſſion, from Mr. CULLEY's Treatiſe on Live-Stock.

				Average weight of fleece per lb.	Price of wool per lb.	Average weight of wethers per quarter.	Yearsold when killed.
					s. d.	lbs.	
Diſhley	no horns	white faces and legs	long wool	8	0 10	25	2
Lincolnſhire				11	0 10	25	3
Tees-Water				9	0 10	30	2
Dartmore Natts				9	0 8	30	2½
Exmoor	horned	ditto	ditto	6	0 8	16	2½
Dorſetſhire	ſmall horns	ditto	fine ſhort wool	3½	1 2	18	3½
Herefordſhire	no horns	ditto	very fine ſhort wool	2	2 9	14	4½
South-Down	ditto	grey faces and legs	ditto	2½	2 0	18	2
Norfolk	large horns	black faces and legs	fine ſhort wool	2	1 5	18	3½
Heath	ditto	ditto	coarſe long wool	3½	0 6	15	4½
Herdwick	no horns	ſpeckled faces and legs	ſhort wool	2	0 6	10	4½
Cheviot	ditto	white faces and legs	fine ſhort wool	3	0 11	16	4½
Dunfaced	ditto	dun faces and legs	ditto	1½	3 0	7	4½
Shetland	ditto	colours various	fine cottony wool	1½	3 0	8	4½
Daniſh Breed	*ditto*	*white faces and legs*	*fine ſhort wool*	1½	0 10	8	4½

To have entered again on a minute detail of the particulars in which theſe various ſorts of ſheep differ from each other, would have been contrary to the plan of this work*; it being rather propoſed to convey information, in regard to the general mode of managing flocks of ſheep, and to point out the great advantages that the inhabitants of theſe kingdoms at large muſt derive from the improvement of this valuable ſpecies of live ſtock: On the other hand, to paſs over this part of the ſubject altogether in this place, might by many be deemed improper. The writer, therefore, anxious to avoid the two extremes, ſhall adopt a middle courſe; and having had the moſt ample opportunities, however indifferently he may have improved them, of aſcertaining the comparative properties of two varieties of the long-woolled ſheep, *viz.* thoſe in the county of Northampton, which may be called the Lincolnſhire, and the Bakewell, Diſhley, or new Leiceſter breed, the reſult of that inveſtigation, as detailed in his Report of the State of Agriculture

* Had it been conſiſtent with the arrangement the writer had adopted, he is ſenſible, that when compared with the Treatiſe above mentioned, it would have been extremely imperfect. Mr Culley's ſuperior knowledge in that line, his long and extenſive practice, and his general acquaintance, rendered him peculiarly well qualified for ſuch a taſk.

ture in the former county, is here ſubjoined, and whence every reader may draw his own concluſions.

About twenty-five years ago, an improvement was attempted, by croſſing the ancient breed with tups from Warwickſhire and Lincolnſhire; the breed of Warwickſhire being noted for great bone or ſize, and that of Lincolnſhire for the quantity of wool.

With the ſucceſs of this experiment the farmers ſeemed perfectly ſatisfied; as a general opinion prevailed, that the animal would feed in exact proportion to the ſize of the bone, and that an additional quantity of wool might be produced, without any detriment to the carcaſe. This practice, therefore, went on for many years. The new breed improved greatly in ſize; and the farmers gave themſelves no trouble to aſcertain, whether the increaſe in ſize and weight could be accounted really beneficial or not.

So fixed and rivetted were they in the opinion of the good choice they had made, that it was not without much difficulty they could be perſuaded of the poſſibility of introducing any additional improvement. This, however, has of late years been effected; and the new Leiceſter or Diſhley breed, (which form a complete contraſt to the former), are pretty generally introduced, owing principally to the fol-

lowing circumſtance. Mr Bakewell, whoſe name ſtands unrivalled in that line, about the year 1788, inſtituted a ſociety, conſiſting of himſelf and fifteen or ſixteen other reſpectable farmers in Leiceſterſhire, and the other counties.

This Society had for its object the improvement of the different breeds of live ſtock, particularly of ſheep: And by almoſt every account they ſeem to have ſucceeded beyond their moſt ſanguine expectations.

To follow them through all the experiments which they have individually made, or to detail the proofs which they are ready to produce in regard to the difference of bone, offal, wool, &c. in order to aſcertain the advantages which the new Leiceſterſhire breed poſſeſſes over every other, would be an endleſs taſk. And though theſe experiments ſeem to have been fairly and candidly made; yet, as none have been attempted, in order to prove the ſuperiority of any other breed over this, it appears a matter of more general importance to ſtate fully in what reſpects this breed is ſaid, by thoſe more immediately intereſted, to excel all others, and then leave it to the impartial public to determine whether they have ſucceeded, and to what extent.

1ſt, It is ſaid, that this breed will, on a given quantity and quality of food, produce a greater profit to the farmer than any other.

2dly,

2*dly*, That they are extremely handſome or well made, and therefore more diſpoſed to fatten.

3*dly*, That they carry more fleſh and fat on the ſame weight or ſize of bone.

4*th*, That they will thrive on ſuch paſture as other flocks, of ſimilar ſize, would fall off upon.

5*th*, That an acre of land will maintain or fatten a greater number of them, than of any other breed which bear the ſame proportion in ſize of carcaſe.

6*th*, That though the quantity of wool is about one-fifth leſs than that of the old Northamptonſhire breed, yet the value by the pound is about one-tenth more; and that, for the reaſon laſt mentioned, both the quantity and quality of the wool, if the return be calculated by the *acre*, muſt be in favour of this breed.

7*th*, That this breed are ready for market in April or May, whereas the others cannot be offered to ſale before September or October; and that therefore not only a greater number can be kept on an acre, as above mentioned, but a ſummer's graſs is ſaved in the one caſe, which is conſumed in the other.

8*th*, That the mutton of this breed, in conſequence of the cloſeneſs of its texture, will keep

ſeveral

ſeveral hours longer in warm weather, than that of any other of the ſame ſize.

Theſe are the moſt valuable properties which this ſort of ſheep is ſaid to poſſeſs over all others; and if they really do poſſeſs them, it is not to be wondered at, that their ſuperiority ſhould be ſo ſtrenuouſly maintained.

On the other hand, it is aſſerted by many, that all the boaſted ſuperiority conſiſts more in the high prices at which the members of the Society diſpoſe of their tups, than in any real improvement in the ſhape or conſtitution of the animal; and therefore they affirm, that this ſuperiority muſt fall to the ground, as the breed comes to be more generally introduced.

It is perfectly clear, that high prices given for any ſpecies of breeding ſtock certainly does not, *in every inſtance*, prove the intrinſic value or ſuperiority of the breed; and therefore, if the new Leiceſter ſheep have nothing elſe to recommend them, they will not long keep up to their preſent character; but thoſe who ſeem anxious to depreciate this breed, ought to come forward with ſomething more likely to carry conviction to the mind, than bare unſupported aſſertions, which they cannot expect will meet with much credit.

The particulars above ſtated, in which this breed are ſaid to excel all others, (and which have

have been inſerted here, in order to bring the queſtion fairly to iſſue), may be proved true or falſe by every intelligent farmer in the neighbourhood; but as no attempt of this kind has hitherto been made, it is but fair at preſent to ſuppoſe, that the ſuperiority really remains unqueſtionable. The writer of this Report pretends to no particular knowledge in regard to the different breeds of ſheep, and is one of thoſe who would be ready to ſuppoſe, that the ſize alone is what ſtamps additional value on either a ſheep or a bullock; hence, what is here ſtated, is the ſubſtance of what he learned in the courſe of his ſurvey, rather than his own private ſentiments. It is, however, the general opinion over the kingdom at large, whether it be well or ill founded, that the new Leiceſter breed of ſheep is ſuperior to every other. Though it is not intended to ſtate, that it has attained the higheſt poſſible degree of perfection, to which it is practicable to bring the ſpecies,—a point which, it is preſumed, the Members of the Society, deeply intereſted as they are, will not maintain; yet, in place of withholding that degree of praiſe to which this Society ſeems ſo juſtly entitled, it would be fortunate for the community at large, if ſome men, equally knowing and attentive, would endeavour to prove the poſſibility of improving this ſpecies of live ſtock to a ſtill higher degree of perfection; in the proſecution of which

which attempt, every wellwiſher to his country will be anxious for their ſucceſs.

It may be added, that one great objection to the new Leiceſterſhire ſheep is, *their diſpoſition to fatten to an extraordinary degree* *; and that they are not ſo *delicate eating* as thoſe ſheep which require longer time to be ready for the market. It is believed, that the warmeſt advocates for this ſort of ſheep will not heſitate to allow their diſpoſition to fatten, though they may diſpute the other point, which depends in a great degree on the taſte of the conſumer; but, if it is certain that a quarter of this mutton, weighing upwards of 30 lb. will only have 2 lb. weight of bone, while a quarter of the *old improved Northamptonſhire breed* of the ſame weight, will have about 5 lb. the improvement of the breed is at once determined, ſo far as the opinion of the *great body* of the conſumers can go;

* This is a fact in which all are agreed; and although mutton with three or four inches of fat on the ribs may not be agreeable to the nice taſte of ſome individuals, yet it ſeems to ſuit the palates of the great body of the conſumers. Beſides, it ſhould be obſerved, that the fat, which at the deſire of ſome cuſtomers is cut off, is as valuable to the butcher as any other part of the animal. What he does not ſell as ſuet for puddings, the uſe to which it is commonly applied, he can at all times diſpoſe of to the tallow-chandler, and for a valuable conſideration.

go; as a mechanic or labourer, who has a large family to ſupport by his earnings, if ſenſible of the fact, will be ready to agree with the new Leiceſter Society, that an improvement has really been effected, at leaſt to the extent of the value of 3 lb. of meat in a quarter of mutton, compared with that of an equal weight of bone.

The above properties of the new Leiceſter breed of ſheep, may be reckoned, in ſo far, ſure criterions by which farmers may determine the circumſtances neceſſary to be attended to in breeding live-ſtock, particularly ſheep. A handſome form; a diſpoſition to fatten quickly, and at an early age; bone ſmall; little offal; the ſuperior quality, and, when rated by the acre, the additional quantity of wool; and becoming fat, with a leſs portion of aliment than is neceſſary for keeping other ſorts of ſheep in ordinary condition; are particulars worthy the conſideration of ſtock breeders, and to which the experienced in that line pay due attention.

When a farmer adopts the reſolution of endeavouring to improve his ſtock of ſheep, either in regard to the ſymmetry of the carcaſe, or the quality of the wool, he ought to conſider, in the firſt place, the ſituation and circumſtances of his farm, and the particulars in which his ewes are deficient; and then, hire or purchaſe tups of that breed, which, while they are not too delicate

licate or too large for his paſtures, poſſeſs in the greateſt degree, thoſe points in which his own are deficient. If he thus act, and afterwards ſelect the beſt individuals that are produced from this croſs, for the purpoſe of breeding from, he is much more likely to attain his object, than if he go on coupling his ewes with a variety of tups, each poſſeſſing, perhaps in a great degree, ſome one of the good properties of which he is deſirous his ſtock ſhould be poſſeſſed. This, it is believed, was the method practiſed by Mr Bakewell; and if thoſe who tread in the ſame path are to any conſiderable degree as ſucceſsful, they will not have reaſon to repent the requiſite expence or attention.

Great caution ought at the ſame time to be uſed by all ſtock farmers, not to introduce a larger or more delicate breed, however valuable, than the nature of the ſoil and climate will properly admit. Suiting the ſtock to the ſituation of the farm, in theſe reſpects, is one of the moſt important points that merits the farmer's conſideration, and has proved a greater bar to the general improvement of live-ſtock than many people imagine. To attempt to introduce the great black cart-horſe of England into the mountainous diſtricts of Wales, or the large ſhort-horned breed of cattle into Shetland or Orkney, would be an act of impropriety, that would in due time meet its reward,—diſappointment. To introduce

introduce the Bakewell, or other vale breeds of ſheep, into cold bleak ſteril ſituations, would in all probability be an attempt equally hazardous. There are evidently two great diſtinguiſhing features in the character of the ſheep of this iſland; thoſe common in the champaign country, being a heavy, ſlow moving, tame, and rather inactive animal, are peculiarly well adapted for a country rich in paſtures, and properly incloſed; while the mountain breed, having a light carcaſe, an active diſpoſition, and a conſtitution much more hardy than the other, are better adapted to undergo the fatigue of ſearching for food. Another deſcription of ſheep, forming a kind of medium between the two above mentioned, are alſo very common in England, and occupy what may be called the gentle eminences of the country, as the Suſſex Downs, the Wiltſhire Downs, &c. This ſort is much more agile, and better formed for walking, than the vale ſheep, while they are leſs wild and untractable than the mountain breed, to which, however, they ſeem more nearly allied than to the other.

Before deſcribing the modes uſually adopted for managing theſe different ſorts of ſheep, a peruſal of Mr Culley's deſcription of a tup cannot fail to be agreeable to the reader. "The head "of a tup," this eminent breeder ſays, "ſhould "be fine and ſmall; his noſtrils wide and ex-

"panded;

" panded; his eyes prominent, and rather bold
" or daring; ears thin; his collar full, from his
" breaſt and ſhoulders, but tapering all the way
" to where the head and neck join, which ſhould
" be very fine and graceful, being perfectly free
" from any coarſe leather hanging down; the
" ſhoulders broad and full, which muſt at the
" ſame time join ſo eaſy to the collar forward,
" and cline backward, as to leave not the leaſt
" hollow in either place; the mutton upon his
" arm, or fore-thigh, muſt come quite to the
" knee; his legs upright, with a clean fine bone,
" being equally clear from ſuperfluous ſkin, and
" coarſe hairy wool, from the knee and hough
" downwards; the breaſt broad and well for-
" ward, which will keep his fore-legs at a proper
" wideneſs; his girth, or cheſt, full and deep,
" and, inſtead of a hollow behind the ſhoulders,
" that part by ſome called the fore-flank, ſhould
" be quite full; the back and loins broad, flat,
" and ſtraight, from which the ribs muſt riſe
" with a fine circular arch; his belly ſtraight;
" the quarters long and full, with the mutton
" quite down to the hough, which ſhould nei-
" ther ſtand in nor out; his twiſt, (the junction
" of the inſide of the thighs), deep, wide, and
" full, which, with the broad breaſt, will keep
" his four legs open and upright; the whole
" body covered with a thin pelt, and that with
" fine, bright, ſoft wool."

The

The rules for ſelecting breeding ewes from the flock, have already been mentioned; namely, to take only ſuch as poſſeſs, in an eminent degree, thoſe properties which are deemed eſſential in that particular variety. Ewes are allowed to copulate at the age of eighteen months; that is, about Michaelmas twelvemonths after they are lambed. They go five months with young; and, except where houſe-lambs is the object, the uſual lambing ſeaſon is March or April.

The management of the mountain breed of ſheep being extremely different in different parts of the iſland, renders it neceſſary to divide the ſubject under two heads, *viz.* the uſual method adopted on the Cheviot, and the adjoining hills, and that common in the other parts of the country.

The ſheep farmers on the borders of the two kingdoms divide their ſtock into different parcels; as lambs, year olds, two year olds, and old ſheep. Theſe are kept diſtinct from each other; each parcel being placed under the care of a ſeparate ſhepherd. The old ſheep (wethers and two year olds) occupy the more elevated paſtures. The breeding flock, and the young ſheep, thoſe that are more fertile, and better ſheltered. Owing to the attention beſtowed by the ſtore-farmers in theſe diſtricts, in providing winter food for their ſtock, as turnips, hay, *&c.* added to the ſuperiority of the ſummer paſture, which is moſtly green-ſward, and that the beſt

of

of the females only are bred from, the Cheviot breed have been greatly improved; and, from the exertions now making by the ſheep-farmers in that country and neighbourhood, there is every reaſon to hope ſtill greater improvements will in a ſhort time be effected. The wethers are commonly ſold at the age of four and a half; but the practice of diſpoſing of them a year ſooner is more and more gaining ground. Could their diſpoſition to fatten at an early age be added to the other good properties they are known to poſſeſs, it would be a ſource of much profit to the farmers, and the public would be greatly benefited.

The generally prevailing mode of managing the mountain-ſheep, in the other parts of Great Britain, is conducted on principles whence neither profit nor improvement can enſue: Every ewe in the flock is put on a footing; and the ugliеſt and worſt-ſhaped, are by the owner conſidered as equally fit for breeding as the moſt handſome, in caſe the ram be of an approved form. No ſelection is made in the propagation of the ſpecies; nature is allowed to act without control: Hence the degeneracy ſo apparent in the offspring; and hence too the prevailing complaint in many places, that the former breeds, which were celebrated for ſome peculiar properties, are ſaid to be loſt. Although this is the general management, yet it does not apply

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in every cafe: There are numerous inſtances, where the ſtore-farmers, as they are often denominated, ſhew laudable attention, and have in conſequence proceeded conſiderable lengths in improving their flocks.

During ſummer, the flocks are allowed to range at large over the hills and commons, often without any perſon to attend or watch over them. Towards the end of ſummer, or rather on the approach of winter, they are collected and brought home, in order to undergo the operation of ſalving*. The old ſheep are again turned out on the mountains; and, where the farm affords that convenience, the hogs or young ſheep are wintered on incloſed paſtures, adjoining to the farm-houſes; otherwiſe, they ſhare the fate of the others. In ſome diſtricts, the whole flock is kept on the paſtures, whether open or incloſed, adjoining to the farm-houſes: Theſe are called the home-grounds; and are intentionally ſaved during ſummer for the purpoſe. When the weather becomes ſevere, they have

* This is a practice adopted, with a view of preſerving the ſheep from ſuſtaining any injury from that inclemency of weather, to which they are expoſed in theſe elevated and ſtormy ſituations, during the winter months. The ſalve, which is compoſed of butter and tar, in proportions according to the expoſed ſituation of the paſtures, is carefully rubbed over the fleeces. The operation is performed uſually in the month of November.

have a daily allowance of hay or ſtraw; and where the home grounds are not ſufficient for the ſtock, paſtures in other parts of the country, more favourably ſituated, are uſually rented. One or other of theſe methods is generally adopted in the north of England, and the ſouth of Scotland. In the northern diſtricts of the iſland, where, from the greater ſeverity of the weather, more attention is requiſite, leſs is beſtowed.

The flocks are in common permitted to ſhift for themſelves, even in the moſt intemperate ſeaſons, and when the face of the country is covered to a great depth with ſnow. Inſtinct, however, directs theſe poor neglected animals to uſe the only means which, under ſuch circumſtances, could be effectual for procuring food. They ſcrape off the ſnow with their feet, ſo as to get down to the heath or withered herbage; an operation which they perform with a ſurpriſing dexterity and deſpatch. In very tempeſtuous weather, indeed, eſpecially when accompanied with falls of ſnow, the ſtore-maſter and his attendants deem it requiſite to reſort to the uſual haunts of the flocks; and by driving them about, and keeping them in motion, to prevent them from being blown up, under mountains of ſnow; a cataſtrophe, however, which all their exertion is not on many occaſions able to pre-

vent, although frequently attempted at the imminent hazard of their lives.

Sheep-husbandry having of late been very generally eſtabliſhed in many of the northern diſtricts of Scotland, where cattle were formerly bred, has been the means of creating an unexampled demand for lambs and young ſtore-ſheep from the more ſouthern hills. This has had the effect not only of greatly advancing the price, but alſo of enhancing the value of the ſtore-farms in the laſt-mentioned part of the kingdom.

Whether this alteration of ſyſtem may ultimately prove a benefit or a misfortune, time and experience only can determine. At preſent, the latter appears more to be dreaded, on ſound principles, than the former, to be expected. The depopulation of the country, which, every candid perſon muſt allow, ought to be ranked in the claſs of misfortunes, rather than in that of advantages, is the firſt conſequence, and cannot fail in time to be ſeverely felt *. The ſouth country proprietors and ſheep-farmers are no doubt,

* The feelings of thoſe gentlemen, who have been moſt zealous in this *laudable undertaking*, of depopulating their eſtates, muſt be very different from thoſe which their anceſtors poſſeſſed. They, with the attention of parents, watched over the intereſt, and, to the utmoſt of their power, promoted the happineſs, of every individual of the clan. What a contraſt does the conduct

doubt, for the preſent, deriving benefit from this change of ſyſtem, by ſo many ſheep being annually purchaſed for the purpoſe above mentioned: but when theſe hills ſhall be completely ſtocked; when the tide ſhall begin to turn, and numerous flocks be annually driven ſouthward to a market, which in a country without commerce, without manufactures, nay, almoſt without inhabitants, that can afford to uſe mutton as an article of food, muſt neceſſarily be the caſe,—it muſt have ſuch an effect on the price of ſheep in the great markets in the north of England, as will in a few years deprive them of all their former gains.

In regard to thoſe new adventurers, whether, beſides other diſadvantages they labour under, they have fully calculated the expence and riſk conſequent on ſending a low-priced animal perhaps three hundred miles to a market, that is, from the counties of Roſs, Sutherland, or Caithneſs, to Cumberland, Weſtmoreland, *&c.* is a matter

conduct of the preſent proprietors form! We behold them ſcattering over the face of the earth, with the moſt unrelenting ſeverity, the deſcendants of thoſe very people, whom their forefathers cheriſhed with ſo much care. Yet view the conduct of theſe men, in the Senate of the nation, or in public aſſemblies, and hear them deſcant on liberty, property, the rights of man, and other ſuch topics; and one would be almoſt perſuaded,—that they were patriots,—lovers of their country,—friends of mankind.

matter in which they are more immediately intereſted than the public.

Previous to the late great extenſion of mountain ſheep huſbandry, lambs, or young ſtock, were ſeldom ſold by the ſtore-farmers. The uſual practice was to ſell the wethers to butchers, or graziers in autumn, when three and a half, or four and a half years old. The old ewes were alſo ſold in the end of the year to graziers, who, after wintering them on more ſheltered commons, or on incloſed paſtures, fattened them, together with their lambs, in the courſe of the following ſummer.

There is little difference in the management of the ſhort-woolled ſheep in the different counties of England where they prevail. The practice of folding, if not univerſal, is at leaſt very general. The ſheep are folded all the year round; in ſummer and autumn, for the moſt part, on fallow, and other lands in the courſe of preparation for wheat; during winter, ſometimes on the ſtubble-fields, but moſt frequently on the downs or paſtures; and in ſpring, on the lands intended for barley. As the folds are placed on the tillage-lands the greateſt part of the year, the chief paſtures lie conſequently at a conſiderable diſtance from the folds; on which account, the light active ſhort-woolled ſheep have been found, from experience, greatly preferable to any of the vale breeds that have hitherto been tried.

The

The chief object the farmers in the down diſtricts had in view by keeping flocks of ſheep, was, till of late years, manuring their tillage lands. They have, however, now diſcovered, that, by beſtowing more attention than they formerly did, the quantity of manure may be increaſed, while the animals themſelves may be rendered more valuable. The degree of emulation that has lately taken place among the owners of the ſhort-woolled ſheep, and the exertions they are uſing for the improvement of their flocks, is only exceeded, on the one hand, by the ſpirited endeavours of Mr Bakewell's diſciples, to retain that ſuperiority which they ſuppoſe their flocks have attained; and, on the other, by the unremitting affiduity of thoſe who are poſſeſſed of other breeds of long-woolled ſheep, to get ſo far forward as to be able to contend with the new Leiceſterſhire breeders for the palm of victory.

The poſſeſſors of the ſhort-woolled breeds of ſheep have, of late, evinced as much care and diſcernment in the ſelection of the breeding part of their ſtock, as in the general management. The tups and ewes moſt remarkable for the fineneſs of their fleeces, and the form of their carcaſes, are ſet apart for the purpoſe; and introducing croſſes from other flocks is a practice alſo frequently followed, when there

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is reaſon to believe it will be attended with ſucceſs.

In the ſummer ſeaſon, or rather, from the beginning or middle of April till the end of October, the downs ſupply ample ſtore of food, which, although ſhort, is very ſweet and nouriſhing. When the ſeaſon is ſo far advanced that other ſorts of provender become requiſite, the ſheep are folded on turnip or cole; and they continue on theſe ſorts of food during the winter, and ſome of the ſpring months. When theſe crops are exhauſted, ſome hay is uſually ſtacked on the downs, on which the flock is chiefly fed till the return of the graſs ſeaſon. The wethers are ſometimes ſold to the grazier at two, but more frequently not till they be three years old: When the farm affords proper convenience for fattening them, they are ſold directly to the butcher, and commonly when about two years and a half. The ewes are ſeldom kept after they are five, or at moſt five years and a half old. The management of the long-woolled, or what has been denominated, the vale breeds, in contradiſtinction to the other two ſorts already noticed, is, with few exceptions, ſuch as muſt meet general approbation, and ſuch alſo as, from the circumſtance of the breeder's being in moſt caſes the grazier, muſt neceſſarily prove the moſt advantageous. In knowledge and attention to what may be called the breeding branch

branch of ſheep-huſbandry, the farmers in the more fertile parts of England, where the long-woolled ſheep are chiefly to be found, greatly exceed all others; and, in the expenditure of money on the improvement of their ſtock, their liberality is more unbounded than that of any other deſcription of farmers in Europe. When it is ſtated, that from twenty or thirty, to two or three hundred pounds, are frequently paid for the uſe of a tup for a ſeaſon, the reader will take it for granted, that the choiceſt ewes of the flock are carefully ſelected for the purpoſe of breeding. Much might be ſaid on the ſubject of hiring tups, and of the rules and regulations adopted by thoſe who are in poſſeſſion of the beſt ſorts. The conduct of the tup-breeders has been cenſured, with great ſeverity, in ſome of the county Reports; but, notwithſtanding the ſarcaſms that have been thrown out againſt them, ſome of which could have been the productions only of an illiberal mind, the writer may venture to predict, that if the practice of hiring tups, at ſuch prices, continues to ſpread with the ſame rapidity it has done for ſome years, and of which he does not entertain a doubt, the improvement of this ſpecies of ſtock will ſoon arrive at a degree of excellence unexampled in any former period.

In reſpect to the general management: The lambs are weaned in the latter end of June, or beginning

beginning of July, and put into an incloſed paſture, where they continue till the end of the graſs ſeaſon, and are uſually put to turnips in the month of November following. On the return of the graſs ſeaſon, the wether hogs, being ſeparated from the young ewes, are put on clover, or other good paſture, where they continue, till the approach of winter renders it neceſſary to put them again on turnips. In the ſpring of the ſecond year they are again put on clover, on the earlieſt paſtures, and are diſpoſed of to the butchers in the following May or June; that is, when little more than two years old. After the young ewes, or year-old female hogs, are taken off the turnip-field, they are put on inferior paſture during ſummer, and form part of the breeding-ſtock, as they are allowed to take the tup when about eighteen months old. The breeding ſtock are uſually kept on turnips, or other green food, during winter, and on the middling paſtures of the farm during ſummer. The ewes are in general draughted off from the flock when three or four years old, and fattened for the butcher. The tup lambs are ſelected with great attention, and reared with much care.

The ewe lambs that are defective in any of thoſe points which a ſkillful breeder thinks eſſential, are never mixed with the breeding ſtock; they are commonly ſold to the butcher when lambs,

lambs, or if not, kept in paſtures ſeparate from the tups. In a word, the general management is not only well calculated for producing valuable ſtock, but alſo to render it in every reſpect the moſt profitable. It will appear obvious, that the ſeaſon for ſheering ſheep muſt vary, according to the climate of different diſtricts; ſummer commencing ſooner in ſome than in others. That being the caſe, the beſt way, a writer on the ſubject obſerves, is to be directed by the weather, ſo that the ſheep may neither ſuffer by the cold, when ſtripped of their wool, nor be injured through too great heat, by being made to wear it too long.

The wethers have conſiderably more wool than the ewes. In the fleeces of either there are ſeveral qualities; ſome reckon eight or nine different ſorts. Theſe are all ſeparated from each other in England by a ſet of men, called wool-ſtapplers, who are appointed for the purpoſe, and who are ſworn to do juſtice between the grower and the merchant or manufacturer. It is ſurpriſing that the Britiſh Wool Society, a Society eſtabliſhed for the expreſs purpoſe of endeavouring to improve the quality of wool, particularly that of Scotland, has not got this uſeful regulation extended to that kingdom; more eſpecially as there is not a member of the Society but muſt know, that the Scotch wool is in general ſent to be ſtapled in Yorkſhire.

The age of ſheep, like that of cattle, is diſcernible by their teeth; they are denominated one ſhear, two ſhear, &c. according to the number of fleeces that have been ſhorn. A ſheep of one ſhear, or of one year old, has two broad teeth before; a two ſhear ſheep has four; a three ſhear ſix; and a four ſhear, when it is ſaid to be full mouthed, eight. After four, the teeth begin to break and ſhorten.

The buſineſs of a ſhepherd is very important, as on his due care and unwearied attention depend in a very great degree the welfare and value of the ſtock, and conſequently the profit of the owner. The buſineſs of a ſhepherd is to ſuperintend the flock at all times, and more particularly at the lambing ſeaſon; to take care that no improper tup intrude at the ſeaſon of copulating; to determine the proper time for ſhearing or clipping the fleece; to draw out ſuch ſheep as are in condition for the grazier or the butcher; and ſuch alſo, as from age or deformity, are improper to be kept longer in the flock. He ought alſo to have a competent knowledge of the diſeaſes of ſheep; of the proper remedies to be applied, and of the modes of application. In ſhort, he ought to be diligent and attentive; a competent judge of the good properties which the particular breed of ſheep, of which he is to have charge, ought to be poſſeſſed; and he ſhould alſo, eſpecially where the

breeder

breeder is the grazier, be able to determine, with precision, what part of the flock is and what is not in condition for the butcher.

Although little attention has been beſtowed, but at ſome few particular periods, to improve the breed of ſheep, either in regard to form, ſize, or quality of wool; yet, in all ages and countries, it ſeems to have been deemed a matter of the greateſt importance to keep up, or rather to increaſe this ſpecies of ſtock, in point of numbers.

The improvement of the various ſorts of ſheep in this country, may be ſaid, in general, to be yet in its infancy. In ſome diſtricts, greater progreſs has been made than in others; while in not a few they remain, according to the Cumbrian's expreſſion formerly quoted, "Sik as God ſent!" Whether the man of obſervation and reflection conſiders the ſpirit for improving the breeds of this valuable animal, that at this time prevails in many parts of theſe kingdoms, eſpecially in England, in an agricultural, a manufacturing, or a great national view, he muſt, if he wiſh the proſperity of his country, feel the moſt pleaſant ſenſations ariſe in his mind, from the certainty, that the labours of ſo great a number of the moſt reſpectable farmers in the iſland will, if perſevered in, be ſooner or later crowned with ſucceſs: He will, at the ſame time, re-

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gret, that ſo many of the farmers, along the weſtern and northern coaſts in particular, remain in an inactive ſtate; that hitherto few of them have adopted the reſolution of ſetting out on this ſure road to the attainment of individual wealth, and national proſperity.

It was already ſtated, that ſome breeds of ſheep were better for particular ſituations than for others. Mr Marſhall ſomewhere obſerves, that "every ſoil has its own ſtock;" an obſervation which muſt be conſonant to the ideas of every man who is in any degree acquainted with ſtock-huſbandry. But although, as in proportion to the goodneſs of the paſture, and the temperature of the climate, ſo ought to be the nature and conſtitution of the animal; yet no perſon will chuſe to maintain, that any of the general breeds above mentioned are either ſo good or ſo bad that they cannot be improved. Hence it is equally an object of importance to ſheep-farmers, of every deſcription, to devote their attention to the improvement of their ſtock. To the proprietors and farmers in the mountainous parts of the country, it is even more ſo than to thoſe who reſide in the level and fertile diſtricts: Neither the carcaſe of the animal nor its fleece can, it is true, ever become ſo valuable as thoſe of the low country breeds; but they may both to a certainty be improved in a comparative degree. Thoſe people ought at the ſame time

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to keep in mind a circumſtance that appears to merit their ſerious attention, namely, that it is by improving the native breeds of ſheep chiefly, that the rugged and leſs productive parts of the country can be occupied to the greateſt advantage; while they muſt be ſatisfied, that the rich paſtures, where the long-woolled ſheep are moſt prevalent, may be converted into tillage at pleaſure.

It was hinted in a former part of this Section, that the Britiſh nation is indebted to the very uncommon exertion, ſteady perſeverance, and ſuperior knowledge, of the late Mr Bakewell, as a ſtock-farmer, for ſetting afloat that ſpirit for improving the breeds of the different ſpecies of live-ſtock, which, fortunately, now ſo conſpicuouſly and ſo generally diſplays itſelf in the ſouthern parts of the iſland: That *plain honeſt man*, for in theſe three words his character may be ſummed up, was early bred to huſbandry, and for the laſt forty years of his life, devoted his attention chiefly to the improvement of the different ſpecies of live-ſtock, and with ſuch a degree of ſucceſs as raiſed him to a greater height in general eſtimation, than any other practical Britiſh farmer in this or any former age ever attained.

The improvement of the breeds of ſheep was his firſt, and always his favourite object. This was no doubt the conſequence of his reflecting,

that the improvement of no other ſort of live-ſtock would tend ſo materially to promote the joint intereſts of agriculture, manufactures, and commerce.

When Mr Bakewell entered on the active management of the farm of Diſhley, about the year 1760, the breed of ſheep in that and in every other part of England, was conſidered as meriting no attention; improving the quality of the wool was in no inſtance attempted; great ſized, large boned, coarſe looking animals, were prevalent in all the better paſtures of the kingdom. This diſcerning man, after repeated examinations of the different breeds then common, diſcovered, that one ſort poſſeſſed properties peculiar to themſelves, while ſome again were remarkable for others materially different, although not leſs eſſential in the form of what he conſidered the moſt valuable breed of ſheep, viz. in the form of that animal, which on a given quantity and quality of food, would yield the greateſt profit to the breeder and the grazier, and at the ſame time be moſt uſeful to the conſumer. Being ſatisfied, that with due care in the ſelection, and by beſtowing proper attention afterwards to the breeding-ſtock, the good properties of various breeds might be united in one, he ſet about the arduous and important undertaking. In the courſe of excurſions into various parts of England, he ſelected ſuch tups

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and ewes as were moſt proper for his purpoſe, and began a courſe of experimental ſheep-huſbandry, on a larger ſcale, and purſued it for a longer period, than any other individual in this, and probably in any nation, ever did. The ſucceſs which attended his uncommon exertions is well known. Soon after he commenced his experimental courſe of ſheep-huſbandry, he began to hire out or let his tups for a ſeaſon; for ſome he received fifteen ſhillings, for others a guinea. As the merit of this new breed became known in the neighbourhood, the price of his tups advanced; ten, fifteen and twenty guineas, were given for ſome of the beſt. The fame of this breed diverging into more diſtant diſtricts, and the ſuperiority which it poſſeſſed over every other becoming the general ſubject of converſation, and of inveſtigation, among all ranks and degrees of ſtock-farmers, and terminating always in favours of the Diſhley breed, were the means of raiſing its character in the proceſs of time to ſuch a height, that a few only, and theſe ſelf-intereſted perſons, venture now to diſpute its being ſuperior to every other. It was formerly mentioned, that high prices given for any ſpecies of breeding ſtock does not, in every inſtance, prove the intrinſic value or ſuperiority of the breed. A perſon ignorant of the properties which a good tup ought to poſſeſs, may give a hundred guineas for the uſe of one,

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for which a real judge would not give ten. That tup, therefore, cannot be fairly rated at more than ten guineas value; but when the moſt eminent ſheep-breeders in the nation, as it were by univerſal conſent, and during a long courſe of years, acknowledge the ſuperiority of the Diſhley breed beyond all others, by giving, in ſeveral inſtances, one, two, three, and ſometimes four hundred guineas, for the uſe of a tup from that flock for a ſeaſon, the matter ſeems to be completely decided. This muſt be the caſe, unleſs it can be ſuppoſed, that a majority of the proprietors and farmers of the firſt reſpectability, in point of judgment, intelligence, and ſucceſs in huſbandry, in every county of England where this breed has been eſtabliſhed, can be ſuppoſed to have allowed themſelves to have been duped by a ſingle individual for upwards of forty years together. If further proof of the ſuperiority of this breed be deemed neceſſary, it may be drawn from the conceſſions made by thoſe who from prejudice, or ſelf-intereſted motives, are anxious to depreciate it in the public eſteem. While they ſtrenuouſly maintain, that, upon the whole, the breed of their particular diſtrict is ſuperior; yet they allow, that it is capable of being greatly improved by *a daſh of the Diſhley blood.* In ſhort, it ſeems to be admitted by every impartial man, that the Diſhley breed, in regard to docility, diſpoſition to fatten

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at an early age, and in lightneſs of bone and offal, is ſuperior to every other in England.

When Mr Bakewell's exertions, perſeverance and ſucceſs, in improving that breed of ſheep which was formerly of the greateſt value, ſhall be faithfully detailed in the page of Britiſh hiſtory, then, but probably not till then, will it be known, how much this man deſerved of his country, and how negligent it was in rewarding the ſervices he had rendered it. It will ſcarcely be believed in future times, that Mr Bakewell, after croſſing the ſeas in queſt of ſuperior breeds of live-ſtock; and, after having exerted his talents, and ſpent his time and his fortune, in attaining the object he had in view, was allowed by the Britiſh Legiſlature, and the Board of Agriculture, to drop into his grave unheeded, neglected and forgotten; and that too, after having lived to ſee a portion of the public treaſure of the nation voted to a man, who mounted into notice, as it were, in the courſe of a day, and who had at beſt but a diſputed title to ſuch a donation *.

* Mr Elkington, who received a grant of L. 1000 from Parliament for diſcovering a *new* method of draining land; but of which Dr Anderſon claims the merit, as having detailed the particulars in a publication of his, upwards of twenty years ago.

Had Mr Bakewell been bred to arms, and had he commanded and been victorious in a battle, in which ten thouſand of his fellow creatures had met an immature death, while every ſtreet would have reſounded with, "He comes, he "comes, the hero comes!" the higheſt honours of the ſtate would have been conferred upon him. But Mr Bakewell turned his attention to other objects; he ſtudied only the peaceful arts; his ambition was not to deſtroy mankind, but by every poſſible means, to provide for the ſupport of an increaſing population, and to furniſh the manufacturer with raw materials of a better quality, and in greater abundance. For deeds ſuch as theſe, it would appear, the Legiſlature of this country has provided no reward. Had any ſuch been held out, Mr Bakewell, without a rival attempting to interfere, would have carried off the prize.

In regard to the merit of Mr Honyborn, the nephew and ſucceſſor of Mr Bakewell, the public can as yet form no correct opinion. Thoſe, however, who have had the beſt acceſs to know, are unanimous in thinking him thoroughly qualified for the arduous taſk he has undertaken, namely, *that of ſucceeding his uncle in the management of the moſt valuable breed of live-ſtock in the Britiſh dominions.* Conſidering the Diſhley farm as the great national ſtore-houſe, whence

whence the other ſheep-farmers in the more fertile parts of the iſland are to draw their means of effecting ſtill greater improvements in this valuable ſpecies of ſtock, it ſeems a duty peculiarly incumbent on the members of the Board of Agriculture, both individually and collectively, to afford Mr Honyborn that ſhare both of countenance and patronage, which an undertaking ſo meritorious, and ſo likely to be productive of great national conſequences, is entitled to receive.

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SECTION IV.

Swine.

THIS ſpecies of live-ſtock is the fouleſt, the moſt gluttonous, and moſt waſteful, of all the brutal tribe that have hitherto been domeſticated. Swine delight to live in mire and dirt, and ſeem fond of ſuch coarſe and putrid fare as almoſt every other animal abominates. Notwithſtanding of this, they are found from experience to be profitable both to the breeder and feeder, and wholeſome and nouriſhing, alſo as an article of human food.

Both Varro and Columella deſcribe what was conſidered in their time as the marks of a good hog, *viz.* a ſmall head, ſhort legs, long bodies, large thighs and neck, and the briſtles, particularly on the neck, thick ſet, erect and ſtrong.

The breeding of hogs in Scotland, at leaſt in any conſiderable number, is a branch of rural economy on which attention has been only recently beſtowed. The only way of accounting for this circumſtance is, that many of the Scotch peaſantry had formerly, although this prejudice is now greatly abated, nearly as great an averſion to pork, on the ſcore of taſte as the Mahometans

metans have, on account of their religious principles.

In England it is very different; the farm-ſervants and labouring people in that country live very much on pork and bacon, particularly in the ſummer ſeaſon; and there being conſequently a very great demand for theſe ſorts of animal food, the farmers, diſtillers, &c. find it advantageous to keep, in many caſes, numerous herds of ſwine.

There are different breeds of ſwine in theſe kingdoms. The Berkſhire and Hampſhire hogs are the largeſt; but it is moſt probably from the Berkſhire ſtock, that the greateſt number of the varieties in England have ſprung. They are of a very large ſize, the four quarters frequently weighing when fat, not leſs than from ſix to eight hundred weight; the medium weight of the hogs fattened for hams and bacon in England, will not, however, exceed from three to four hundred weight.

A breed from China has been for many years introduced, and is ſpread very generally over the country, particularly throughout the north of England and the ſouth of Scotland. Theſe, although much inferior to the Berkſhire ſort in point of ſize, poſſeſs, in a remarkable degree, a property which will always ſtamp a value upon every ſpecies of live-ſtock, a diſpoſition to fatten quickly, and at an early age.

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Along the ſouthern boarders of the Grampian Mountains, and in almoſt all the Highland diſtricts to the northward, there are hogs very frequently to be met with, whoſe appearance, being very different from that of any other ſort in the iſland, denotes them to have been the original breed of the country. They are ſmall, ill-formed, briſtly, wild looking animals, and are very probably the remains of that breed, which we may ſuppoſe to have ranged through the foreſts and woody parts of the kingdom for ages in a ſtate of nature. This breed is ſeldom ſeen in any part of the low country, except when brought down for ſale about the cloſe of harveſt; and as more valuable breeds (the Engliſh and Chineſe) are now very common where theſe formerly found a market, and as a great many of the Highlanders would rather ſtarve than eat pork, there is little doubt but this breed will ſoon become extinct; ſhould it ſo happen, the nation will not ſuſtain any conſiderable loſs.

Swine are a more prolific ſtock than any other that falls under the care of the huſbandman. A ſow goes four months with young, and has uſually two litter of pigs in the courſe of the year. The number is extremely variable; ſometimes only two or three, but more generally from ſix to twelve. Varro makes an obſervation on this ſubject, that ſeems of importance

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to be attended to by thoſe who are in the practice of breeding great numbers of ſwine; he remarks, that we may judge of the fruitfulneſs of a ſow from her firſt litter; for ſhe generally brings about the ſame number ever afterwards. Pigs that are intended for rearing are allowed to ſuckle ſix or eight weeks; when ſold to the butcher, it is commonly at the end of three or four. The ſow requires to be fed in an extraordinary manner while ſhe is nurſing, particularly if ſhe have a number of pigs to ſupport. Whey, ſkimmed milk, grains, waſh from diſtilleries; in a word, almoſt any thing will do, if it be given in abundance. The pigs reared by the farmers are fed, for ſome weeks after they are weaned, on whey or butter-milk, or on bran or barley-meal mixed with water. They are afterwards maintained on other food, as potatoes, carrots, the refuſe of the garden, kitchen, ſcullery, &c. together with ſuch additions as they can pick up in the farm-yard. Sometimes they are ſent into the fields at the cloſe of harveſt, where they make a comfortable living for ſeveral weeks on the gleanings of the crop; at other times, when the farm is ſituated in the neighbourhood of woods or foreſts, they are ſent hither to pick up the beech-maſt and acorns in the fall of the year.

When arrived at a proper age for fattening, which is regulated by circumſtances to be af-

terwards explained, they are either put into ſtyes fitted up for the purpoſe, or ſold to diſtillers, ſtarch-makers, dairy-men, or cottagers.

Swine are ſold to the butcher at different ages, and under different names; as pigs when a few weeks old; as porkers at the age of five or ſix months; and as full grown hogs at from eighteen months to two years old. The young pigs are commonly roaſted whole; the porkers are uſed as freſh or pickled pork; and the full grown hogs are for the moſt part converted into ham and bacon.

The demand for porkers, which, from London in particular, is very great, and which continues almoſt throughout the year, is chiefly ſupplied from the dairies within reach of that metropolis. From the time they are weaned, they are kept conſtantly on whey, or ſkimmed or butter milk, with frequently an addition of peaſe or beans, or barley-meal. Such good keeping not only makes them increaſe rapidly in ſize, but renders them fit for the butcher at an early age.

There are ſeveral modes adopted for fattening hogs, each materially different from the other: But ſuch is the nature and conſtitution of the animal, which ſeems diſpoſed to fatten on any ſort of food, provided it receive an ample and regular ſupply; that it is probable there is leſs difference in the taſte and flavour of its fleſh, in conſequence of its being fed on one ſort of food in

in place of another, than is perceptible under ſuch circumſtances in that of either cattle or ſheep.

In Hampſhire, Gloceſterſhire, and ſome others of the foreſt-diſtricts, beech-maſt and acorns are much uſed, not only as food for hogs while rearing, but alſo as means of fattening them. In the former caſe, the hogs are driven into the woods, and allowed to forage for ſubſiſtence for a conſiderable part of the year, as well as in autumn: In the latter, thoſe intended for ſlaughter in the end of the year, are brought home from the foreſts ſoon after the fall of the acorn and beech-maſt is over; they are then put into ſtyes, and their fattening is completed with the ſame ſort of food, (a great quantity of which is collected by the poor people and ſold to the farmers for the purpoſe), with an addition of peaſe or beans, or barley-meal.

The dairies are the great ſources whence the Engliſh butchers draw their ſupplies of hogs, as well as porkers. Juſt as the dairies are employed, either in the making of butter, or of cheeſe, ſo whey mixed with barley-meal, or ſkimmed and butter-milk, are the chief ſorts of food on which the hogs on a dairy-farm are fattened. Many are the incidental additions daily made to the ſtock of proviſions ſet apart for the fattening hogs; in ſhort, every ſort of offal from the dairy, the kitchen, &c. is thrown

into the trough; but milk and whey, or barley-meal, with an allowance of peaſe and beans for a few weeks before they be killed, conſtitute the chief articles of food given to fattening hogs on all dairy-farms.

Very great numbers of hogs are annually fattened at the diſtilleries in the various parts of theſe kingdoms. It is ſtated in the Report of the county of Surry, that between nine and ten thouſand are fattened on the grains, waſh, and other offals of three diſtilleries only in that diſtrict. From this ſome idea may be formed of the total number of hogs thus annually made fit for the butcher. In the firſt ſtage of fattening they are only allowed grains and waſh; but for ſome weeks before they are ready for market, they are allowed daily a certain quantity of meal or grain; this not only brings them faſter forward, but renders their fleſh firmer, and better adapted for curing as ſalt proviſions, the uſe to which it is for the moſt part applied.

Perhaps of all the modes in which hogs are fattened, that adopted at the corn-mills and ſtarch-works is the beſt; while the food on which the hogs are fattened (the refuſe of grain) is freeſt from any nauſeous mixture; it is alſo more nutritive than any other that is applied to the ſame uſe. Conſidering how many corn-mills and ſtarch-works are erected in theſe kingdoms, and that at all of them, there is a certain

number

number of hogs, the number annually fattened at theſe places muſt be very great.

There yet remains another method to be deſcribed; and, whoever will reflect, that it is adopted by the great body of the farmers and cottagers in Great Britain, will be ſatisfied, that more hogs are fattened in that way than in any, or in all the others above mentioned. There are few farmers of any note, who do not fatten ſome hogs annually; and in England very few cottagers who have not one or two for the uſe of their families. The farmer uſually rears them about the farm-yard, at a mere trifle of expence; and when arrived at a proper age for fattening, a few potatoes, the refuſe of the kitchen and garden, with a ſmall allowance of corn, complete the buſineſs. The cottager purchaſes his pig or two when he can do it for the leaſt money; they are allowed to feed on the common or in the foreſt during ſummer; and about the cloſe of harveſt are taken into better keeping, which generally conſiſts of potatoes, or other vegetables, and the offals from the houſe, with the addition of a few pecks of corn, either purchaſed for the purpoſe, or gleaned by the children in ſome adjoining field.

The ordinary ſeaſon in which full grown hogs are ſlaughtered, is from the end of October to the end of March, that being the beſt time for ſalting proviſions of any kind. The

methods uſually practiſed in this country for curing ham and bacon are ſo well known, that a detail of the particulars would be unintereſting; but as Weſtphalia has been long celebrated for the ſuperior excellence of the ham and bacon cured there, a deſcription of the method practiſed in that country, is extracted from Bradley's Treatiſe on Huſbandry and Gardening*, for the information of the reader. "The me- "thod uſed to cure bacon in and about Ham- "burgh and Weſtphalia, is after this manner: "Families that kill one, two, or three hogs a- "year, have a cloſet in the garret joining to "their chimney, made very tight and cloſe to "contain ſmoke, in which they hang their ba- "con to dry, out of the reach of the heat of the "fire, that it may be gradually dried by the "ſmoke only, and not by heat. The ſmoke is "conveyed into the cloſet by a hole in the "chimney near the floor, and a place made for "an iron ſtopper to be thruſt into the funnel of "the chimney about one foot above the hole, to "ſtop the ſmoke from aſcending up the chim- "ney, and force it through the hole into the "cloſet. The ſmoke is carried off again by "another hole in the funnel of the chimney "above the ſaid ſtopper, almoſt at the ceiling, "where

* Vol. i. p. 364.

"where it vents itſelf. The upper hole muſt "not be too big; becauſe the cloſet muſt be al- "ways full of ſmoke, and that from wood fires; "for coal or turf, or peat ſmoke, I apprehend, "will not do ſo well.

"The manner of ſalting is no other than as "we ſalt meat in common; ſometimes they uſe "our Newcaſtle ſalt, or St Abb's, or Liſbon "ſalt. In thoſe parts they do not ſalt their "bacon or beef ſo much as we do in England, "becauſe the ſmoke helps to cure as well as the "ſalt."

As this ſpecies of live-ſtock, deteſtible as it is in many reſpects, does certainly poſſeſs many properties in a ſuperior degree to the other ſorts, or rather peculiar to itſelf, the improvement of the breed is by no means an object that ought to be conſidered unworthy the farmer's attention. It is a more prolific animal, and its fleſh alſo ſells as high if not higher, than that of any other. Its fleſh is, beſides, of all others the beſt for ſalting, and will keep when properly cured, for the longeſt period. Its fat or lard, is more valuable than that of other animals; its very hair (briſtles) are uſeful in various articles of manufacture; and what alſo ought to have its weight, ſwine will live on ſuch aliment as every other animal would reject.

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The circumſtances to be attended to in endeavouring to improve the breed of ſwine, require not to be detailed, as they are generally well known. Smallneſs of bone and offal, and a diſpoſition to fatten quickly, and at an early age, are the moſt eſſential particulars that the farmer ought to keep in view.

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SECTION V.

Rabbits.

THERE being many thouſand acres of the light ſandy unproductive lands in theſe kingdoms occupied as Rabbit Warrens, and a much greater extent that is better adapted for that ſyſtem of huſbandry than for cultivation or planting, it cannot be deemed improper to give a ſhort account of the management of lands ſo occupied.

There are two varieties of this ſpecies of live-ſtock in this iſland, and which are more or leſs valuable, according to the uſes to which their fur is applied. The common grey is the moſt prevalent, the fur of which is chiefly uſed in the manufacture of hats.

The other ſort, imported originally from Ireland, is diſtinguiſhed from the former by the name of the Silver-grey. The ſkins of the ſilver-grey rabbits, being for the moſt part dreſſed as furs, and exported for the uſe of the higher claſſes of people in China, are double in value to that of the others.

Rabbits always burrow, or ſcrape out lodgements in the drieſt, and commonly in the moſt elevated

elevated parts of the warren. They are a ſort of ſtock that require very little attention, except during ſevere weather in winter, when it is neceſſary to furniſh them with a ſupply of food beyond what they are able themſelves to procure. Hay or turnips, when rabbits are managed with that degree of attention that is neceſſary to render a warren productive, are uſually ſcattered on different parts of the feeding ground during the latter part of winter and beginning of ſpring. The poſſeſſors of rabbit warrens in Suffolk have lately found out a new and ingenious method of furniſhing rabbits with the means of ſubſiſtence at theſe ſeaſons. They ſcatter billets of new felled wood in different parts of the warren, the bark of which the rabbits eat with great avidity, and thereby a ſmall quantity only of hay, if any, becomes requiſite.

The moſt ſolid objection againſt warrens, is, that the rabbits frequently ſtray into the neighbouring corn-fields, and often materially injure the growing crops. This is a conſequence naturally to be expected, where the warrens and the corn-fields are in an open-field ſtate. The warrens, however, particularly when ſituated near tillage-lands, are for the moſt part incloſed. This is performed in different ways; ſometimes by ſtone-walls or paling; but the more

common

common practice is, to erect fences of turf, and to cape them with withered furze, thorns, &c.

There are ſeveral methods uſed for catching rabbits; it was formerly the practice to train ſmall dogs or ferrets, for the purpoſe of going into the burrows; but this has been long ſince diſuſed, and has given way to other methods, by adopting which, a power, both of ſelection and reprieve, is reſerved to the farmer. Rabbits are now catched either in nets or traps: When the former method is adopted, the nets, ſet in the form of a fold, are placed between the burrowing and the feeding grounds during night, or very early in the morning, and the rabbits, in returning to their lodgments, are hunted into theſe folds. The traps uſed are large pits, dug in the way to the moſt uſual haunts of the rabbits, and covered by a kind of folding or falling door, with a ſmall trap-door towards its centre, into which the rabbits are led by a narrow muſe or track *.

In emptying the pit, the rabbits are ſorted; ſuch as are fat, and in ſeaſon, are ſlaughtered; and thoſe that are lean, or otherwiſe out of condition, are reprieved, either for the purpoſe of fattening or breeding.

In

* See Marſhall's Rural Oeconomy of Yorkſhire, Vol. ii. p. 266.

In regard to the value of a rabbit warren by the acre, much depends on local ſituation. If, within reach of a large town, where there is a conſtant demand for the fleſh of theſe animals, it is conſiderably more than in a remote part of the country, where the carcaſe brings comparatively a ſmall price.

In ſituations not remarkably favourable, the fleſh of a rabbit ſells at from fourpence to ſixpence, while the ſkin brings from ſixpence to tenpence, according as this ſort of fur is in requeſt among the hat and other manufacturers. Mr Young eſtimates, in ſome of his writings, that ten rabbits are killed yearly from every acre of a warren. If that be the caſe, and the prices above mentioned be accurately ſtated, which, it is believed they are, the medium annual value of a rabbit warren, by the acre, without deducting the price of hay, turnips, &c. which cannot be aſcertained, may be rated at ten ſhillings and tenpence the Engliſh acre,—a much greater ſum, without doubt, than ſuch lands as are commonly occupied in this way, would produce under any other management.

Conſidering the numerous large tracts of light barren ſandy lands that are ſituated in many parts along the eaſtern coaſts of theſe kingdoms in particular, which in their preſent ſtate are

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of little or rather no value to the owners; and conſidering alſo, that they are incapable of being rendered productive by cultivation; the proprietors cannot probably turn their attention to a more effectual mean of improvement, than by converting them into rabbit warrens.

CHAP.

CHAPTER XXII.

The Management of a Dairy.

DAIRY Huſbandry, in its different branches, is more or leſs eſtabliſhed in every county in Great Britain: Few of them, however, can boaſt of having arrived at any excellence in the art. Glouceſter, Cheſter, Wilts, and a few others in England, and Ayrſhire in Scotland, ſtand firſt in the liſt of cheeſe-making diſtricts *; while Eſſex, Cambridge, and Suffolk, are equally celebrated not only for the quality but the quantity of butter that is thence exported to London and other markets. In ſome parts of England, the breeding and rearing of live-ſtock occupy to a great degree the attention

* There is a greater quantity of good cheeſe made for the public markets in Ayrſhire, and in the borders of Renfrewſhire, than probably in all Scotland beſides. There this branch of huſbandry is eſtabliſhed as a regular ſyſtem. The cheeſe is well known in many parts of Scotland and America, under the name of *Dunlop-cheeſe*.

tion of farmers; while, in others, the paſtures are chiefly devoted to the fattening of cattle and ſheep. In Scotland, with the exception above mentioned, dairy-huſbandry is certainly in its infancy. At the houſes of the proprietors and principal farmers, it is true, that cheeſe of a tolerable quality, and butter inferior to none in the iſland, are always to be found; but the butter and cheeſe made in common in the country for the ſupply of the towns, is in general of ſo inferior, ſo bad a quality, that no man, who poſſeſſes any degree of veracity, however partial he may be to his native country, will ever attempt to ſpeak or write favourably of it. What was ſaid of the Scotch dairy-huſbandry, by a writer of the laſt century, is very applicable to the preſent times: "The next thing I ſhall ſpeak "of," he ſays, "is concerning the making of but-"ter and cheeſe, and, to ſay no worſe of it, our "women, generally throughout this kingdom, "*kyth* (ſhew) as little dexterity in this as in any "point of houſewife operations I know *."

In eſtabliſhing and managing a dairy, ſeveral particulars merit attention. The dairy-houſe ſhould be ſo large, in proportion to the number of cows to be kept, that there may be ſufficient convenience for performing all the neceſſary operations without embarraſſment. It cannot be kept too cool in ſummer; nor can too much attention be given to

* Donaldſon's Huſbandry Anatomized, p. 85.

to cleanlineſs in every ſituation. For theſe reaſons its being placed near a ſpring or rill of water, and where practicable, overſhadowed with trees, may always be conſidered as important matters in regard to the ſituation of a dairy. It ſhould be neatly paved either with brick or ſtone, that when waſhed, which ſhould be done every day, the water ſhould not ſink through ſo as to create an improper damp. The dairy-houſe ſhould alſo be well ventilated, and a full circulation of air permitted; but as it is alſo neceſſary to have the power of excluding too great a quantity, lattice-windows, made to alter at pleaſure, are much preferable to the common ſort, which, in the ſummer-months, admit too freely the rays of the ſun. The utenſils ſhould alſo be kept perfectly clean, be frequently ſcalded with hot water, and afterwards ſcoured and bruſhed with great care and attention. The veſſels in which the milk is ſet, ought to be thoroughly ſcalded and cleaned every time the milk is taken out. Without theſe precautions it is impoſſible that the produce of a dairy, whether of butter or of cheeſe, can be of ſuperior quality, or ſuch as will keep ſweet and good for any length of time. Cleanlineſs may indeed be ſaid, not only to be neceſſary in dairy-huſbandry, but to be the foundation, —the moſt eſſential and leaſt indiſpenſable part, of good management. A farmer may be in poſſeſſion of the moſt valuable breed of cows,

and

and theſe be fed on the richeſt paſtures; but unleſs cleanlineſs prevail in the dairy, his butter or his cheeſe will never ſtand high in general eſtimation.

Next to the ſize and ſituation of the dairy-houſe, and to keeping it and the utenſils clean, ſkill and attention in the general management fall under conſideration. Whoever has had occaſion to ſuperintend the operations carried on in a well conducted dairy, even for an hour, muſt have been ſatisfied, that ſkill was as requiſite in the perſon who directed, as attention and alertneſs in thoſe who executed. In a word, it muſt to ſuch have appeared obvious, that without a knowledge of the beſt modes proper to be adopted under every circumſtance, and a regularity, method, and prompt attention to the execution, the buſineſs of a dairy would, in a ſhort time, go into inextricable confuſion.

In deſcribing the dairy-huſbandry of Great Britain, it appears neceſſary to divide the ſubject into as many ſections as there are modes of conducting the buſineſs; or more properly, as there are principal objects to which the dairymen direct their attention. Theſe will be found claſſed in the following order:

Section I.

Section I. Dairy management, where the milk, fresh from the cow, is sold for the use of the inhabitants of towns.

II. Ditto, where butter is the chief object.

III. Ditto, where butter and cheese are both made.

IV. Ditto, where cheese only is made.

V. General observations on dairy-husbandry, the methods of feeding cows, &c.

SECTION I.

Dairy Management, where the Milk, freſh from the Cow, is ſold for the Uſe of the Inhabitants of Towns.

In the agricultural deſcription of the county of Middleſex, the number of cows neceſſary for ſupplying the inhabitants of London with this article was mentioned. Although no other town in the iſland requires nearly ſo great a ſupply, yet in the ſuburbs of every town of any magnitude, there are a deſcription of people called Cow-keepers, whoſe buſineſs it is to ſupply their cuſtomers with new milk regularly every morning and evening. This branch of dairy-huſbandry, although neceſſary for the accommodation of the people in towns, does not give room for a long detail of the particulars of management. In the neighbourhood of London, the owner of the cows takes no concern about the milk; the whole of his attention is devoted to other objects; namely, purchaſing the beſt cows he can procure, and feeding them in ſuch a manner as to make them produce the greateſt quantity of milk. He contracts for the milk of a certain number of cows with the milk-dealers, a ſet of people who make a trade of diſpoſing of it in town. Theſe people attend every morning

and evening for the purpoſe of milking the cows, and when the milk is meaſured over to them, the dairy-man's charge and trouble, in regard to that part of the buſineſs, is at an end, as the after management and riſk of ſale devolve on the dealers. Theſe people are generally, and the writer believes juſtly, reckoned very expert at cooking up the milk for market; and various means are ſaid to be uſed for that purpoſe. They, it would ſeem, are apprehenſive that milk freſh from the cow would be too ſtrong for the debilitated conſtitutions of the generality of their cuſtomers, and on that account they are in common very attentive to dilute it plentifully with water.—In the neighbourhood of towns of leſs note, the cow-keepers are the ſellers alſo of the milk, and which they uſually do in a more pure and leſs adulterated ſtate.

The cows kept in ſuch dairies as above deſcribed, are fed in a different manner from thoſe in the more remote parts of the country. Except during the height of the graſs-ſeaſon, they are maintained chiefly on malt-grains and hay, with ſometimes turnips and potatoes, and in many inſtances are confined to the cow-houſes or ſheds almoſt throughout the year. A great quantity of milk being, in ſuch ſituations, the chief object of the dairy-farmers, every degree of attention is beſtowed, both by feeding high, and at regular ſtated intervals, to increaſe the quantity as much as poſſible.

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SECTION II.

Dairy Management, where Butter is the chief Object.

To the claſs of dairy-farmers mentioned in the former ſection, ſucceed, in point of local ſituation, thoſe whoſe principal object in keeping cows, is ſupplying the inhabitants of the towns with freſh butter, and of which, as it is an article that cannot be carried to a great diſtance, they may be ſaid to have the excluſive ſale.

It is almoſt unneceſſary to mention, that butter is the fat, or oily part of milk, extracted or ſeparated therefrom by means of motion. In the management of milk, after it is drawn from the cow till the butter be extracted, many particulars merit attention.

Before entering into a detail of the methods uſually adopted, it may not be improper to mention thoſe which have been long common in Devonſhire and Cornwall; and which, if not ſuperior to any other, have at leaſt ſingularity to recommend them*.

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* Bradley's Treatiſe on Huſbandry and Gardening, vol. ii. p. 306.

The reader will be ſurpriſed to learn, that in thoſe diſtricts the uſe of the churn, even to this day, is in a great meaſure unknown. The Agricultural Report of the county of Devon contains the following particulars reſpecting the dairy management in that part of England.—They put the milk into pans, either made of copper tinned, or of braſs, or into brown earthen veſſels glazed, which they place on a ſtove, gently heated with charcoal, and ſcald it until the cream be raiſed to the ſurface by the operation of the heat. When it has continued on the ſtove a certain time, which the dairy-maid judges of by practice, bringing it as near to boiling as poſſible without doing ſo, it is then ſet to cool. Twelve hours are ſufficient to ſtand in winter, although it generally remains from four o'clock in the afternoon to ſeven the next morning. Sixteen hours are cuſtomary in ſummer. The cream is then taken off, and it is worked up by the hand, without any churn, into butter. The operation is performed by the dairy-maid's turning the cream round with her hand in a circular motion, always moving it in one direction, which unites the particles together.

By thus ſcalding the milk, the cream is forced up to the top with greater effect, than when it is allowed to riſe naturally and gradually in the ordinary way. The cream ſo obtained is called

ſcalded,

ſcalded, and ſometimes clouted cream, from its being of a more tough and gluey nature than what is, in ſome of the neighbouring diſtricts, by way of diſtinction, termed raw-cream. Bradley, in the Treatiſe before quoted, ſays, that he remarked the butter in Devonſhire taſted of ſmoke, and was apt to grow rank ſoon after making, which he attributed to the above-mentioned mode of management, eſpecially to the uſing braſs pans, as braſs generally communicates part of its rank quality to any liquor, and more particularly when it is allowed to remain in theſe veſſels for twelve or ſixteen hours at a time.

In regard to the cleanlineſs of this method of making butter, it is unneceſſary to make any remark; the reader will at once be ſatisfied, that if cleanlineſs ought to be recommended and adopted in the management of dairies in other parts of Great Britain, cleanlineſs in the dairy-maids of Devonſhire ſeems moſt eſſentially requiſite.

The moſt approved management of butter-dairies in Great Britain, may, it is hoped, be learned by a peruſal of the following particular detail.

When the milking of the cows is completed, which is uſually effected by ſix o'clock in the morning, and before ſeven in the even-

ing*, the milk is ſtrained through a hair ſearch or ſieve, into large ſquare ſhallow ciſterns, covered with lead, or into wooden veſſels, in Scotland called cogs, and in Glouceſterſhire, and ſome other places in England, ſkeels; there it remains for ſome time, according to the ſtate of the weather, and other circumſtances. The milk is commonly ſet to the depth of five or ſix inches in the cogs; but when leads or ciſterns are uſed, which is generally the caſe in England, from two to three inches is the uſual depth. Setting out milk in large ſhallow ciſterns, is certainly much preferable to the other method, as a greater quantity of cream is not only by that means obtained, but it is alſo found from experience, particularly in Cheſhire, that the expeditious cooling of the milk, has conſiderable influence in preventing its tendency to acidity in warm weather. At the ſame time it ought to be obſerved, that, while the Engliſh method is in this reſpect preferable to that adopted in Scotland, the practice of uſing lead for covering theſe ciſterns or coolers, is certainly improper and dangerous; as although theſe lead coverings may be kept very clean, by rubbing or ſcouring them with ſalt, ſea-ſand, &c. yet nothing can prevent a certain portion, at leaſt, of the poiſonous quality of the lead

* In Scotland, it is very common to milk cows three times a-day during the graſs ſeaſon; in the morning, at mid-day, and in the evening.

lead from affecting the milk, eſpecially if it be allowed to remain in the ciſterns for any length of time.

There are two methods of ſeparating the cream from the milk; that moſt generally practiſed, is to ſkim it off with a ſkimming-diſh, made either of tin or of wood *. The other is adopted only where leads or ciſterns are common, and where the milk is uſed for making ſkim-milk or two-meal cheeſe; and of courſe, before it coagulate, or acquire any degree of acidity. Towards the centre of the ciſtern, there is a hole or pipe, which, before the milk be put in, is ſhut with a wooden ſtopper, that riſes ſeveral inches above the ſurface of the milk. When the milk is wanted for any of the purpoſes above mentioned, a veſſel is placed under the pipe, and the ſtopper drawn up ſo far as to allow the milk to run off, but ſo gently, that the ſurface of the cream is not broken. The milk being thus gradually drained off, the cream ſinks down, till it at laſt reſts on the ciſtern, when the veſſel containing the milk being removed, and another placed for the purpoſe of receiving the cream, the ſtopper is entirely drawn out, and the cream drops into the veſſel.

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* Milk, in the uſual management, is never ſkimmed but once. In the county of Eſſex, however, the uſual practice is, to ſkim it three or four times, or till no more cream riſe; when the milk is given to the hogs.

The cream, when ſeparated from the milk, is put into large earthen jars, or into wooden veſſels made with ſtaves and hoops, in the form of a ſmall caſk, but open at one end. It is difficult to ſtate any particular period for its being kept in theſe reſervoirs before churning, ſo different is the management in this particular. About Epping in Eſſex, which has been long in high repute for the ſuperior quality of its butter, the cream is ſeldom kept above three, or at fartheſt four days.

It was the practice in a large dairy in Suffolk, which the writer was led to viſit ſome years ago, on account of the character it had obtained for making butter of a ſuperior quality, when the butter was to be ſent directly to market, to churn the cream the ſecond or third day; but when it was to be ſalted, the cream was kept a day or two longer, or till it had acquired a certain degree of acidity. The dairy-woman, who had had long and extenſive experience, accounted for her conduct in this reſpect, by obſerving, that butter made from freſh cream was much better, and pleaſanter to the taſte, but that it would not take in the ſalt ſo well, nor keep ſo long, as that made from cream that had been longer kept.

During ſummer, or while the cows are fed on graſs, no art is requiſite to give butter that colour which is agreeable to the purchaſer or the conſumer;

conſumer; but in the winter and ſpring months, the dairy people find it neceſſary, in order to pleaſe their cuſtomers, to alter that tallowy colour which is natural to butter in theſe ſeaſons. This is done by uſing a little Spaniſh arnetta, which after being pounded, or otherwiſe reduced to as ſmall particles as poſſible, is mixed with the cream before it be put into the churn, and in ſuch quantities as, from experience, has been found neeceſſary for giving the deſired colour.

There are three ſorts of churns uſed in theſe kingdoms, and theſe are worked in very different ways. The moſt ancient is the plump or plunge churn, called in ſome places the ſtanding churn, in contradiſtinction to the common barrel churn, which is kept conſtantly in motion during the operation of butter-making. The ſtanding churn is of very ſimple conſtruction, being a wooden veſſel between three and four feet high, and from eighteen inches to two feet in diameter at the bottom, becoming narrower towards the top. The plumper, or the inſtrument by which the cream is kept in motion, is nothing more than a piece of round board, bored or cut into holes in ſeveral places, and fixed to a long handle by which it is worked. This handle being paſſed through a hole in the cover of the churn, a perſon keeps conſtantly moving it upwards and downwards till the butter or butyraceous particles unite.

The common barrel churn, which is of later invention, is of more general uſe than any of the others. It is a barrel made in a bulging form, being ſeveral inches more in diameter at the middle than at either end, and of greater or leſs ſize according to the extent of the dairy, or the number of cows that are milked. It has boards called daſhers, fixed end-ways within, which by agitating the cream ſeveral times at every turn of the barrel, greatly facilitates the work. It is ſupported on a frame of wood by two iron rods, one fixed to each end. The one rod reſts on one of the poſts of the frame, and turns on a pivot in a notch made in the poſt, the other ſupported by the oppoſite poſt, forms the handle by which the barrel is ſet in motion.

The other is of ſtill later invention, and it is alſo of the barrel form. It is called the Patent Churn, from the circumſtance of the inventor having procured a patent for making churns of that deſcription. It differs from the other barrel churn, only in that it does not move round, and that, like the ſtanding churn, it admits atmoſpheric air through a funnel left open in the top. A road of iron, forming the handle at the one end, is paſſed end-ways through the centre of the barrel, and reſts on the two frames, in the manner before deſcribed. Within the barrel is fixed a kind of axle round the rod, in which are placed four rows of ſpokes, at regular diſtances,

diſtances, and fixed at the extremity by four bars of wood, ſo that, by turning round the handle, the frame-work within acting four times at every going round, keeps the cream in conſtant motion.

From the practice generally adopted in the beſt managed dairies of cooling the churn, by filling it for ſome time with cold water before churning, in ſummer, and of warming it with ſcalding water, when the weather is very cold in winter, and of putting in alſo cold or hot water among the cream in the churn occaſionally, according to the ſeaſon of the year, it is obvious, that cream poſſeſſing a proper temperature, whatever that temperature may be, is, among the moſt exact dairy people, conſidered eſſentially neceſſary in the making of good butter. That being admitted, it follows, that the firſt or the laſt of the churns above mentioned, by admitting freely a ſupply of atmoſpheric air, and permitting that which, from the violent agitation, has become overheated, to eſcape, are better calculated for preſerving that medium temperature which, it would appear, cream, in the courſe of making into butter, ought to poſſeſs, than the common barrel churn, which is kept conſtantly ſhut up, or where the air is only allowed to enter or eſcape, by ſometimes drawing a plug placed near the mouth of the barrel,

When

When the operation of churning, which conſiſts in keeping the cream conſtantly in motion till the butyraceous particles ſeparate from the milk and adhere to each other, is completed, the butter is taken out of the churn, and put into a ſkeel or cog, along with ſome cold ſpring water, where that can be procured. The dairy-maid then, when ſhe is attentive to her buſineſs, and has a conſiderable quantity of butter to manage, muſt undergo a conſiderable degree of labour; and which, being of that ſort on which in a great meaſure the quality of the butter depends, it may not be improper here minutely to deſcribe.

After the butter is put into the ſkeel, and the water poured over it, the dairy-maid begins by kneading it with her hands, and afterwards breaking it into as minute diviſions as poſſible; and by rolling and preſſing it againſt the bottom of the veſſel, endeavours to expreſs any milk that it may contain. When it has thus been well worked, the milky water is poured out, and an additional quantity of pure clean water put in; and the operations of kneading, breaking and preſſing are again renewed, and continued till the water at laſt appears ſcarcely tinged with milk, which is the only proper criterion by which to determine when the butter has been thoroughly worked.

In

In moſt caſes a ſmall quantity of ſalt is mixed with butter intended for immediate uſe; when butter is ſalted, whether with a view to keeping, or for immediate ſale, the ſalt is uſually applied immediately after the milk has been extracted in the manner above deſcribed. Part of the butter is ſpread on the bottom of another ſkeel, which had been previouſly waſhed and prepared for the purpoſe; and a quantity of ſalt being ſtrewed over it, an additional layer of butter is then laid on; over this another ſprinkling of ſalt; and ſo on alternately till the whole be ſalted to the proper degree, according to the uſe for which the butter is intended. When the whole is thus ſalted, the dairy-maid again kneads, breaks and works it in ſuch a manner, as to make the ſalt mix intimately with it; and when ſhe thinks ſhe has effected this purpoſe, ſhe pours ſome ſpring or other cold water over the whole; and by again working the butter, ſhe waſhes it free from the brine, and from any milky ſubſtance, which by the ſalting, and the repetition of kneading, preſſing, &c. may have been expreſſed.

The operations of butter-making, and ſuch as are deemed neceſſary to be performed preparatory to its being ſent to market, being now gone through, all that remains is to weigh and make it up in the form in which in that particular diſtrict it is moſt ſaleable. In ſome places it is weighed

weighed in pounds, containing from 16 to 28 ounces, according to what is rated a pound of butter in the market where it is to be ſold. In others it is made up partly into pounds and partly into half pounds, ſo as to ſuit the convenience or taſte of the purchaſers. The uſual form in which it is expoſed to ſale is in rolls; but it is ſometimes made into circular cakes of about three or four inches diameter, and about an inch thick, and on the top of which ſome figures are impreſſed, by means of a wooden print carved for the purpoſe. When the butter (in well managed dairies at leaſt) is weighed and made up for market, it is uſually placed in cold water till the period for ſending it to market arrives. When that happens, in thoſe diſtricts where cleanlineſs is attended to, every print or roll is packed in the large green leaves of the garden orach, a plant frequently cultivated for the purpoſe, or in thoſe of kidney beans, &c. The method uſed in packing butter for market in the vale of Glouceſter, is in every reſpect ſo ſuperior to what is common in other places, and ſo well meriting general imitation, that Mr Marſhall's account of it is here ſubjoined: "In packing a "butter-baſket, the bottom is bedded with a "thick cloth folded two or three times; on this "is ſpread a fine thin gauze-like cloth, which "has been dipped in cold water; and on this is "placed the prints, with a large leaf beneath,

"and

"and a ſmaller upon the centre of each. The "bottom tier adjuſted, a fold of the cloth is "ſpread over it, and another tier ſet in a ſi-"milar manner. At market the cloth is re-"moved, and the prints partially covered with "leaves, are uſeful, as well as pleaſing to the "eye. They ſerve as guards to the prints. "The butter is taken out of the baſket as "well as put into it without being touched, or "the prints disfigured *." When butter is ſalted with a view of diſpoſing of it as ſalt-butter, it is in England commonly put into ſmall caſks called firkins, containing 56 lb. each, and ſold in autumn to the butter-factors or cheeſe-mongers in the large cities or towns. In Scotland, families reſiding in towns generally cauſe make ſmall caſks, there called kitts, which they ſend to ſome of their acquaintances in the country to get filled with butter in the courſe of the ſummer or autumn months; by this means little ſalt-butter is ſold in the ſhops of Scotland, and what is, is of the moſt inferior quality.

The above is the moſt approved methods of making and of managing butter in thoſe dairies ſituated within reach of markets, at which the butter produced in the dairy can be regularly, and to a certainty ſold every week, and in which the

* Marſhall's Rural Oeconomy of Glouceſterſhire, Vol. i. p. 285.

the making of butter is on that account the farmer's chief object. Theſe, however, cannot be ſaid to be generally adopted. That others, in every reſpect inferior, are too common, is a fact which every perſon who depends on the public markets for a ſupply of this neceſſary article will be diſpoſed to atteſt. That ſuch neglect ſhown to the quality of the butter ſold in the public markets ſhould ſtill prevail, notwithſtanding the many repeated complaints made on the ſubject, reflects certainly no ſmall degree of diſgrace on the police of many towns; while the inſtances, eſpecially in Scotland, are very rare, wherein the attention exerciſed in this reſpect is ſo regular or ſo minute, as to obviate the evils complained of, or to prevent a nauſeous abominable rancid ſtuff, exhibited often in the moſt queſtionable ſhape in regard to cleanlineſs, from being expoſed to ſale under the denomination of freſh butter. If proper ſearchers were appointed, as in Yorkſhire, the quantity of *butter* ſold in the markets of Scotland would, as ſometimes happens in that diſtrict, be greatly reduced, while that of *greaſe* would be increaſed in equal proportion.

The quantity of butter produced from a given quantity of milk, depends on a variety of particulars; as, the quality of the milk, the age and quality of the paſtures on which the cows are maintained, and whether the milk is allowed to ſtand a ſufficent time to throw up the whole

cream which it contains. On a medium, four gallons of milk will produce ſixteen ounces of butter; and the quantity which a dairy of cows of any magnitude, in regard to numbers, may be ſuppoſed to yield, may be rated at ſix pounds *per* week in ſummer, and from four to five in winter, according to the manner of feeding.

In the following ſection, the method of making butter from whey, a practice very common in the dairy-diſtricts in England, although ſcarcely known in Scotland, will be particularly deſcribed. In the mean time, a practice which has in ſeveral inſtances been introduced in both kingdoms, *viz.* that of churning the whole milk, merits a minute deſcription.

The milk is ſet to cool in the manner already mentioned, either in leads or in ſkeels, or other wooden veſſels, according to the cuſtom of the particular diſtrict. When it is cooled in leads, in place of being allowed to ſtand there till the cream be thrown up, it is in a few hours put into earthen jars that contain from four to five gallons each, where it remains till it become coagulated, by which time it uniformly acquires a greater or leſs degree of acidity. This, in ſummer, takes place naturally in twenty-four or thirty hours, and in winter the veſſels containing the milk are placed either near the fire, or, where that convenience is erected, cloſe to the ſtove in the dairy. A conſiderable de-

gree of management ſeems requiſite in regard to the milk, when the whole is churned. If it have not been ſufficiently cooled in warm weather before it be put into the jars, it is apt to curdle and ferment; and if it be not churned ſoon after it coagulates, the butter will neither be ſo good in quality, nor ſo large in quantity, as if it had been managed with greater attention, and churned at the proper period.

The old-faſhioned ſtanding churn is in common uſe in the dairies where the whole milk is churned. In ſome places it is worked by a lever, one end of which, ſupported by an upright frame, is fixed to the end of the churn-ſtaff, and the other is connected by a rod to a crank in a toothed wheel, which is worked by a pinion fixed upon the axis of a common winch. By this contrivance, which is extremely ſimple, the buſineſs of churning conſiderable quantities of milk is performed by one perſon, and without requiring any extraordinary exertion.

A gentleman in the neighbourhood of Edinburgh, Mr Johnſton of Hillhouſe, has erected a machine on a very ingenious conſtruction, for the purpoſe of facilitating the operation of churning; it is turned by a horſe, and works three or four churns, each containing between twenty-five and thirty gallons at the ſame time. If the practice of churning the whole milk ſhall be found preferable to the more common mode

mode of churning the cream only, (for the ſuperior advantage of this new method remains yet to be aſcertained), the introduction of machines ſimilar to that erected by Mr Johnſton, cannot fail to prove beneficial in large dairies, where this practice may be adopted. In reſpect to the management of the butter in the dairies laſt above mentioned, there is nothing occurs worthy of remark.

The butter-milk, it was formerly obſerved, was for the moſt part uſed in fattening hogs. In the north-weſt of England, as Weſtmoreland, Cumberland, &c. and in every part of Scotland conveniently ſituated in regard to market, the milk from the butter-dairies is uſually ſold to the poor people in towns and villages, and at from a penny to twopence the gallon. In the more remote parts of theſe diſtricts, the farm-ſervants, labouring people and cottagers, alſo uſe it as an article of food.

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SECTION III.

Dairy-Management where both Butter and Cheeſe are made.

In all dairies where ſkim-milk and two-meal cheeſes are made *, the produce of butter, conform to the quantity of milk, is conſiderable. It is a common and a well-founded obſervation, that good butter and good cheeſe are incompatible in the ſame dairy; but whether making both butter and cheeſe from the ſame milk may not, upon the whole, be the moſt productive mode of dairying, is both a curious and an intereſting inquiry.

Beſides rearing and fattening calves and pigs, which is more or leſs practiſed on every dairy farm, in the various ways already taken notice of, the management of a dairy, where both butter

* A morning or an evening's milking is called a meal of milk; hence, when the milk of this evening is mixed with that of to-morrow morning, and made into cheeſe, it is called a two-meal cheeſe.

butter and cheeſe are made, may be deſcribed under four heads, *viz.*

Butter from Cream,
Skim-Milk Cheeſe,
Two-Meal Cheeſe,
and
Butter from Whey.

Butter from Cream.—It was mentioned in the laſt ſection, on the authority of a reſpectable dairy-woman in Suffolk, that butter made from freſh cream was better for immediate uſe, although not ſo good for ſalting, as that made from cream which had been allowed to remain ſo long as to contract a degree of acidity. For this reaſon, butter made of cream ſkimmed from milk intended to be made into ſkim-cheeſe, or from the firſt meal of two-milk cheeſe, muſt be better when uſed as freſh butter, than that made from milk which had been allowed to coagulate naturally before the cream was removed. In regard to management in either of theſe caſes, there is no difference from the methods before deſcribed, than that the dairy-maid has it in her power to make the cream into butter while it is quite freſh and ſweet, which cannot happen in the other caſe.

Skim-Milk Cheeſe.—It is propoſed, in the following ſection, to deſcribe as accurately as poſ-

ſible the whole proceſs of cheeſe-making as practiſed in the county of Cheſter, and, on that account, ſuch particulars only, in which the proceſs of making ſkim-milk and two-meal cheeſes differ from the moſt approved modes of making one-meal cheeſes, will fall now under conſideration. When ſkim-milk cheeſes are made, the milk is ſet out in the leads or ciſterns, or other veſſels, generally to the depth of the ſecond joint of the dairy-maid's forefinger, that being the gauge moſt uſually applied. In this ſtate it remains longer or ſhorter, according to the weather, care being taken to ſkim off the cream, or to drain off the milk, in proper time, before it begin to acquire a ſouriſh taſte. If that ſhould at any time happen, either from the exceſſive heat of the weather, or owing to ſome inattention in the general management, in place of putting the ſkimmed milk into the furnace to give it that degree of heat ſuppoſed neceſſary for facilitating the coagulation after the rennet is applied, and which is the uſual practice, the method is, to put it direct into the cheeſe-tub, and to pour in ſuch a quantity of hot water as will give the wiſhed-for temperature. By this means, the riſk of the milk breaking while heating in the furnace, which, when not quite ſweet and freſh, it is apt to do, is avoided, while the intention muſt in every other reſpect be as fully anſwered.

After

After the milk is heated by either of the means above mentioned, and put into the cheeſe-tub, the only particular neceſſary to be attended to in making this ſort of cheeſe, beyond what will be afterwards explained, is to add ſomewhat more rennet than is uſually applied to a ſimilar quantity of milk, which contains either the whole or a great portion of the cream.

Two-Meal Cheeſe.—The quality of milk uſed in making cheeſe of this deſcription is very different. In many caſes the whole of the cream of the firſt meal is abſtracted, and in every caſe a certain portion. In general the quantity is very uncertain, depending on the quality of the paſture, and not a little on the diſpoſition of the farmer in regard to avarice; or, in other words, a deſire to make the moſt of his dairy, without being ſolicitous about the character or ſuperior excellence of his cheeſe.

In the dairies where two-meal cheeſes are made, the milk of the firſt meal is ſet abroad in the leads or other veſſels in the uſual manner; and as it is the evening's milk that is in common added to that of the ſucceeding morning, where this method is practiſed, the operation of cheeſe-making commences immediately after that of the morning making is completed, that is, about five or ſix o'clock. The cream of the evening milk being ſkimmed off, the milk is carried and put into the cheeſe-tub, reſerving ſometimes

ſometimes a half, ſometimes a third, but more frequently only three or four gallons, to be applied to purpoſes now to be deſcribed. The milk that is reſerved, which we may ſuppoſe to be three or four gallons, being put into a braſs pan and made ſcalding hot, by placing the pan in a furnace or veſſel of hot water, the half of it is poured into the cheeſe-tub among the cold milk, and the other half into the pan in which the cream had been put. The cream and the hot milk being intimately mixed together, the whole is poured into the cheeſe-tub, which by this time has received a great addition, if not the whole of the morning's milk, warm from the cows. Thus the milk of the former evening, warmed to a certain degree by the means above mentioned, together with the cream after it has been returned as much as poſſible into the milky ſtate, by being incorporated and intimately blended with part of the ſcalded milk, and added to the milk new drawn from the cows, forms, as it were, a body of fluid of the ſame nature, equal in quality and temperature, and to which rennet is applied in the uſual way. The above mentioned method of remixing, or in the dairy phraſe melting the cream, is, the writer has reaſon to believe, the beſt that is any where practiſed: But it appears extremely *doubtful*, whether this method is ſo effectual for anſwering the intended purpoſe, as to render cheeſe made of

milk

milk ſo managed, and without the addition of any freſh from the cow, equal in quantity and quality to that made entirely of new milk, for that is the only proper criterion by which to judge. There is not perhaps one dairy-man in the iſland, who has hitherto made ſuch a courſe of experiments as to enable him to decide on this point with preciſion.

The matter is however of conſiderable importance to have aſcertained, and merits the particular attention of the more intelligent farmers in the diſtricts where this ſort of cheeſe is generally made.

Whey-Butter.—The practice of making butter from whey is a branch of a dairy management, the particulars of which muſt be both curious and intereſting to many readers; for although it is adopted to a great extent in particular diſtricts *, it is by no means generally eſtabliſhed.

The dairy people diſtinguiſh whey by two different names, that which ſeparates eaſily from the curd, they call "green whey," and that which requires preſſure to extract, they call "runnings, thruſtings, or white whey." There are different methods of extracting the cream from whey. In ſome dairies the whole whey, when taken from the cheeſe tub, is put into ſkeels

* In Derbyſhire more butter is made from whey than from the cream of milk, or from milk churned altogether.

or other veſſels, where it remains for about twenty-four hours, when it is creamed, and the whey applied to the uſe of the calves, pigs, &c. The cream, when ſkimmed off the whey, is put into a braſs pan and boiled, and afterwards ſet in jars, where it remains till a ſufficient quantity for a churning be procured, which in large dairies happens generally once, but ſometimes twice, a-week.

The more common mode of management is conſiderably different from that above deſcribed. The green whey is put almoſt immediately from the cheeſe-tub into the furnace-pan, where it is ſcalded. When it acquires the proper degree of ſcalding-heat, cold water, or ſome white whey, is occaſionally put in; this cauſes the whey to break, and throw up a thick white ſort of ſcum, ſomewhat reſembling cream, which the dairy-maid keeps conſtantly ſkimming off as it riſes, and which ſhe puts into cream jugs or jarrs, where it remains till the uſual time of churning. In the dairies where the green whey is ſcalded, the runnings, except a little that is kept for the purpoſe of forcing the green whey, when ſcalding, to throw up the cream, is uſually ſet in ſkeels or jars, in the ſame manner as the milk from the cows; and the cream, when taken off, being added to that procured by ſcalding, is churned in the ordinary way.

The quantity of butter procured from whey, it would appear, is conſiderable, not leſs in two inſtances, where particular attention was beſtowed to aſcertain the fact *, than about an ounce and a half from the gallon. In regard to the quality, it is unqueſtionably inferior to that of butter made from the cream of milk, or from the milk and cream churned together, but not to ſuch a degree as ſtated by Mr Marſhall in his Rural Oeconomy of Glouceſterſhire, *viz.* one third; at leaſt in the Report of the county of Leiceſter, it is mentioned, that "whey-butter "ſells for 9d. *per* pound, when other butter ſells "from 10d. to 11 d.;" and there it is alſo added, that "*eighteen cows will make about* 17 *lbs.* "*(16 oz. each) of whey-butter* per *week*;"—a circumſtance that certainly merits the attention of thoſe who are in the practice of making either one-meal or two-meal cheeſes.

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* See Mr Johnſton's Account of Whey-Butter, publiſhed in the Appendix to the new edition of the Agricultural Report of Mid-Lothian, p. 60.

SECTION IV.

Dairy Management where Cheeſe only is made.

ALTHOUGH in moſt of the dairies in England, where one-meal cheeſes are made, the practice of making whey-butter is alſo common, yet it was judged moſt proper to allot a ſeparate ſection to the deſcription of the beſt methods of making one-meal cheeſe; and on that account the proceſs of making whey-butter was included in the preceding part of the chapter.

Glouceſter, Cheſter, Wilts, and Somerſet *, are the counties in Great Britain moſt noted for cheeſe of ſuperior quality. Large quantities are annually ſent from Derby, Suffolk, and ſome other counties, to London, and the large trading and manufacturing towns; but in reſpect of character, and of general quality, the cheeſe made in every other part of the iſland is greatly inferior to that in any of the counties firſt above mentioned. As to Scotch dairy-huſbandry in general,

* In the pariſh of Chedder, in the county of Somerſet, the largeſt cheeſes in England are made. Some ſingle cheeſes made there, and which are known by the name of Chedder cheeſe, weigh from one hundred and a half to two hundred weight each.

general, enough has been already ſaid. In regard to cheeſe, in particular, it is only farther neceſſary to remark, that probably four-fifths of the cheeſe uſed at the tables of the higher and middle ranks, and in all the taverns in that country, is the produce of Engliſh dairies.

In deſcribing the beſt methods of making one-meal cheeſe, or what is nearly the ſame, of making cheeſe from milk, whence none of the cream has been previouſly extracted, it is meant to keep chiefly in view that moſt generally adopted in Cheſhire. In cheeſe-making, as well as in every other branch of rural œconomy, variations in management are diſcernible, not only in the general practice of an extenſive diſtrict, but frequently in that of the ſame pariſh or lordſhip. Thoſe that appear of importance ſhall be pointed out in a manner the beſt calculated to enable the reader to form a correct opinion in regard to the beſt method to be adopted in all ſuch caſes.

The following particulars will be found to merit every farmer's attention, who enters on the management of a cheeſe-making dairy:

The beſt ſeaſon for making cheeſe.
—— Milking.
—— Milk.
—— Colouring.
—— Rennet.

The

The Breaking and gathering the curd.

—— Management of cheese in the cheese-press.

—— Method of salting cheese.

—— Management in the cheese-room.

The best Season for making Cheese, is during those months when the cows can be fed on the pastures, that is from the beginning of May till towards the end of September, or in favourable seasons the middle of October. On many of the larger dairy farms, in several districts, cheese is frequently made throughout the year, but that made during the winter months is considerably inferior in quality, and much longer of becoming fit for sale, or for use, than what is made within the periods above mentioned.

Milking.—The ordinary time of milking, in Cheshire, during the summer season, is six o'clock both morning and evening, and in winter at day-light in the morning, and immediately before dark in the evening. In other districts, as Wilts, Suffolk, *&c.* the people are frequently employed in milking by four o'clock in the morning in summer, and the business in a dairy of forty or fifty cows nearly completed, before the usual period at which it commences in Cheshire. This last is certainly the preferable practice, as when the cows are brought home to the fold, or farm-yard, which always happens where the pastures

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are within a reaſonable diſtance, and milked unfettered, which is alſo commonly the caſe, the milking ought to be over before the heat increaſe ſo much as to make the cows reſtleſs and unruly.

One woman is conſidered able to milk ten cows, and that number is uſually aſſigned to each. A man, either the farmer himſelf, or ſome careful perſon, attends the milking of the cows, for the double purpoſe of ſuperintending the due performance of the work, and of carrying the milk in large buckets, (into which it had been occaſionally emptied from the milking-pails), from the fold to the dairy, where it is poured through a ſearch into the cheeſe-tub, preparatory to applying the rennet. In all well managed dairies, particular attention is paid to the thoroughly milking of the cows: when this is omitted the cows are apt to go dry. Beſides, every perſon knows, that the laſt of a milking is very greatly ſuperior in quality to what is firſt drawn.

Milk.—On the quality of the milk, unqueſtionably depends, with ordinary management, the goodneſs of the cheeſe. The terms one-meal and two-meal cheeſes have already been defined. If none of the cream of the preceding night's milk be abſtracted, but made to incorporate with the milk of both milkings united, by the proceſs formerly deſcribed, it does not occur

to

to the writer, that the quality of the cheeſe made from the milk of laſt night, and that of this morning mixed together, can be in any material degree debaſed. But not only in the dairies in Cheſhire, but in every dairy where two-meal cheeſes are made, a certain portion of the cream is withheld.

In regard to that degree of temperature which milk ought to poſſeſs, ſo as to be in the beſt poſſible condition for applying the rennet, all is dark and uncertain. In this branch of the buſineſs general rules are not attended to, nor can they become in any material degree uſeful, as a guide to direct the conduct of an unexperienced cheeſe-maker, as the practice of almoſt every particular dairy differs from that of another. That adopted in Cheſhire, although extremely indefinite, ſeems as a general rule worthy of conſideration, namely, that the loweſt degree of heat which milk ought to poſſeſs when the rennet is applied, is one-half of that of milk from the cow; the higheſt, about twice the natural warmth. From this it may be inferred, that by the time a large dairy of cows can be milked, and the milk put together for the purpoſe of artificial coagulation, the dairy-maid will not err materially by applying the rennet immediately afterwards. This rule is however very uncertain, and liable to exception, on account of the variation in the ſeaſons, and the frequent and great

great changes that take place in the ſtate of the weather in the ſame ſeaſon. Accordingly, in all dairies remarkable for cheeſe of a ſuperior quality, the heat of the milk, before the rennet be applied, is raiſed or lowered by the addition of warm milk or of cold water, to that degree which, in the practice of the particular dairy, is found from experience the moſt eligible.

It is ſurpriſing that in large dairies the uſe of the thermometer is not as well known as that of the ſkimming-diſh. To aſcertain with preciſion, by a courſe of well conducted experiments, the temperature moſt proper for milk to poſſeſs at the time the rennet is applied, could not fail to be greatly in favour of the quality of the cheeſe, and would in all probability tend to prevent the cracking, bliſtering, and hoving, which ſo frequently take place in cheeſe, in conſequence of ſome miſmanagement in the making.

An inſtrument, called a Lactometer, has been lately invented by a Mr Deas, mathematical-inſtrument-maker in Liverpool, which if found, on experience, to anſwer the many uſeful purpoſes for which, in the Report of the State of Agriculture in the County of Lancaſter, it is ſaid to be calculated, muſt have the effect of throwing a great deal of light on the whole ſyſtem of dairy-huſbandry, and muſt be the means, in time, of reducing the buſineſs of butter and cheeſe making, which is at preſent carried on

without any eſtabliſhed rule by which the operator can be guided, to ſomething like fixed invariable principles. This inſtrument is intended to aſcertain the richneſs of milk, by its ſpecific gravity compared with water, and by its degree of warmth, (taken by a ſtandard thermometer), on comparing its ſpecific quality with its warmth. By a ſcale conſtructed for this purpoſe, may, if the principle be right, be diſcovered, not only the comparative quality of the milk of different cows, but alſo of that produced in conſequence of cows being maintained on different ſorts of food, as paſtures, hay, turnips, &c. The following are the inſtances, wherein it is ſaid the lactometer may be uſeful.

In diſcovering what breed of cattle is moſt advantageous for milk,

What food in the winter-ſeaſon, whether carrots, turnips, potatoes, hay, &c. is beſt for milch-cows.

What the effects of different paſtures may be.

How far particular farms are beſt adapted for making butter or cheeſe.

How far the inconvenience of large cheeſes, in ſome dairies, being too rich to mature or ripen properly, may be prevented, by diſcovering when this redundancy of richneſs exiſts in the milk.

And

And laſtly, In fixing a ſtandard for the ſale of this uſeful article according to its quality.

By the uſe of this inſtrument, together with the thermometer, and by diſcovering a mean whereby to aſcertain the ſtrength and quality of the rennet, and what is neceſſary to be uſed for coagulating a given quantity of milk, the management of a dairy, where cheeſe is made, would be greatly improved; eſpecially if, by various experiments made by expert chymiſts, the facts neceſſary to be aſcertained were eſtabliſhed.

Colouring.—The colouring of cheeſe has been ſo long common in the cheeſe diſtricts, that it is probable cheeſe of the beſt quality would be in a great meaſure unſaleable, if it did not poſſeſs the requiſite colour. The degree of colour is regulated chiefly by the name under which it is intended the cheeſe ſhould be ſold, as Glouceſter, Cheſhire, &c. The introduction of this practice was no doubt a ſpecies of fraud, as it was intended to convey an idea of richneſs which the cheeſe did not really poſſeſs. This is the more evident, as it is univerſally allowed, that the leaneſt cheeſe always requires the greateſt quantity of dye to bring it to the proper degree of colour. The colouring of cheeſe is, however, now ſo common, that an intention of fraud cannot, with propriety, be aſcribed to thoſe who adopt the practice.

The

The ſtuff formerly mentioned as being uſed for a ſimilar purpoſe in the butter-dairies, *viz.* Spaniſh arnetta, is the common dye uſed for cheeſe. The weight of a guinea and a half of real Spaniſh arnetta is conſidered in Cheſhire ſufficient for a cheeſe of 60 lb.; and in Glouceſter-ſhire an ounce is the common allowance to the hundred weight.

There are different ways of preparing the arnetta, as well as of applying it. The method uſed in Cheſhire is, when the dye is wanted in the morning, to tie up the neceſſary quantity of pounded arnetta in a linen rag, and to put it into about half a pint of hot water in the evening. In the morning, immediately before applying the rennet, the infuſion of arnetta is poured into the milk, and the mixture is then well ſtirred about, ſo as to make the milk and the dye incorporate intimately together. In other diſtricts, it is common to rub a piece of unpounded arnetta, after having been previouſly dipped in milk, on a ſmooth ſtone, in the ſame manner that paint is ground. The colouring thus obtained is mixed with the milk in the cheeſe-tub, in the manner and at the period before mentioned, care being taken to prevent any of the unreduced particles of arnetta from falling into the cheeſe-tub.

Rennet.—Milk may be coagulated, or turned into a curdled ſtate, by the application of any ſort

ſort of acid. That which is moſt commonly uſed, is the maws or ſtomachs of young calves prepared for the purpoſe. Theſe are denominated Rennets; but in England they are provincially called Vells, and in Scotland Yearnings. When the maws, which uſually contain a curdled kind of ſubſtance, are purchaſed from the butcher, they are opened, and the curd, or thick ſubſtance taken out; this having been repeatedly waſhed in cold water as well as the bag, it is again replaced, with a conſiderable addition of ſalt, and then packed in a jar, into which is poured a very ſtrong brine of ſalt and water. In many inſtances, the maws are allowed to remain in this ſtate for about twelve months before uſing; in others, after having remained ſome time covered with the brine, they are taken out, and an additional quantity of ſalt being applied, they are hung up in the dairy, or ſome other convenient place to dry, and remain in that ſtate till wanted for uſe.

The impropriety of uſing ſmall pieces of vell, that had been previouſly pickled and dried in the manner laſt mentioned, as coagulum, after infuſing them over night in a little warm water, although a common practice even in Cheſhire, appears ſo evidently improper, that it is ſurpriſing it ſhould be anywhere continued. The methods of curing, when each vell is cured ſeparately, and the coagulating powers which one may

may poſſeſs beyond another, are ſo different, that when an inch or two of a particular vell is depended upon for effecting the purpoſe, the dairy-maid muſt remain conſtantly in a ſtate of ſuſpenſe, nor is it poſſible that with all her attention the proper quantity can be in common applied. Whether the vells neceſſary for a ſeaſon are kept in brine, or pickled and afterwards dried, the beſt method of preparing the rennet for uſe, becauſe attended with the greateſt degree of certainty in regard to its being of equal ſtrength and quality, is to extract the ſubſtance from the whole at once. This is frequently done in Cheſhire; but the writer believes nowhere elſe in Great Britain; the only way in the other cheeſe-diſtricts being to uſe rennet extracted from one or two vells only. The beſt mode of preparing rennet adopted in Cheſhire, is to put the vells into an open veſſel, and to pour in two or three pints of ſpring-water for each, according to the number. In this ſtate they are allowed to ſtand about twenty-four hours. The vells are then taken out, and put into other veſſels, with about half the quantity of water. They are then allowed to remain for a like period, when being taken out and thrown aſide, as no longer of uſe, and the firſt and ſecond infuſion being mixed together, and ſtrained through a ſieve into a jar or other veſſel, a conſiderable quantity of ſalt is added. This liquor is then

fit

fit for uſe, and requires no after management beyond that of taking off the ſcum that uſually riſes to the top, and of adding a little ſalt when that already in the jar is nearly diſſolved. About half a pint of this preparation, wine meaſure, is ſufficient for coagulating that quantity of milk which will make ſixty pounds of cheeſe.

No general rule having yet been eſtabliſhed, whereby to determine either the quantity of rennet to be applied, or the proper temperature of the milk at the period of application, it can only be ſtated, that each dairy-maid is obliged to exerciſe her own diſcretion, according to the exiſting circumſtances, in regulating her conduct in this reſpect. But although practice is the only means by which ſhe can acquire a proper knowledge of this branch of the buſineſs, yet the conſequences of proper or improper conduct are well known in every cheeſe-dairy. When the coagulation is accelerated or retarded beyond the proper time, (which in making a 60 lb. cheeſe is reckoned an hour and a half), either by giving too much or too little rennet, or by applying it when the milk is too hot or too cold, not only the quantity of the curd is diminiſhed, but the quality in either caſe materially affected. In the former caſe, it is of a tough gluey texture; in the latter, too tender. After the rennet has been applied, the milk-tub is covered up by a board, over which is laid a

linen

linen cloth; and having ſtood the uſual time, the dairy-maid, on finding that the coagulation is completed, ſets to work, with her aſſiſtants, to ſeparate the curd from the whey, and which is generally called

Breaking and gathering the Curd.—Simple as the buſineſs of breaking the curd may appear, and uniform as one would expect the method to be, yet there are few particulars in the whole art of cheeſe-making wherein ſo great difference is obſervable in practice. In ſome dairies, the curd is at firſt broken or cut in various directions with a cheeſe-knife, an inſtrument made for the purpoſe, and uſed with a view of making the whey ſeparate eaſily, and without carrying off with it any richneſs from the curd. After theſe firſt inciſions, ſome time is allowed for the broken curd to ſubſide. The knife is then again uſed, and more freely than before; and while the dairy-maid ſtirs up the unbroken curd from the bottom with the ſkimming-diſh in one hand, ſhe cuts the larger pieces of curd with the knife, which ſhe holds in the other. Having thus thoroughly broken the curd, and allowed ſome time for its ſubſiding, ſhe then begins to take off the whey with the ſkimming-diſh. In other dairies, not leſs celebrated for good cheeſe, the ſkimming-diſh only is uſed in breaking the curd; and in order to facilitate the operation of ſeparating the whey from the curd,

curd, ſome of the whey that firſt riſes to the top is ſkimmed off, and being either heated or cooled, according to the ſtate of the weather, and the required conſiſtence of the curd, is again returned into the cheeſe-tub, and after remaining a little time, the whole is laded off in the uſual manner.

All the whey that can be extracted without preſſure having been removed, and the cheeſe-tub being raiſed at one ſide, the curd is collected into a maſs, and at firſt preſſed with the back of the ſkimming-diſh. When no more whey can be diſcharged by this means, others more violent are adopted; the curd is, in many caſes, cut with the cheeſe-knife to give vent to the whey, and is then preſſed as hard as poſſible with the hands; in others, a conſiderable weight is frequently applied.

The curd having been in a great meaſure ſeparated from the whey, it is put into two or three pans, or other veſſels, and the dairy-maid and her aſſiſtants break it with their hands as fine as poſſible; in the courſe of doing which, a proper quantity of ſalt, (for the weight or meaſure is ſcarcely in any inſtance aſcertained), is ſcattered over the curd and intimately mixed therewith *. When it is properly broken, rubbed

* According to the method uſually practiſed in Glouceſter-ſhire, when the curd is broken to the requiſite fineneſs,

bed and ſalted, a cloth is ſpread over the cheeſe-vat, in Scotland called the Cheſſel, and the broken curd being packed into it, and covered up with the cloth, a board is laid over the vat, and a weight, great in proportion to the quantity of curd, placed upon it, by which means the remaining whey is preſſed out. Where the cheeſes uſually made are of a large ſize, as in Cheſhire, the dairy-maid thruſts a number of iron ſkewers (through holes made in the ſide of the vat, for the purpoſe,) into the curd in various directions. Theſe being withdrawn, the openings made by them ſerve as ſo many drains for permitting the whey to run off. When the whey, in place of running freely, which it does at firſt, only falls in drops, the weight is removed, and the curd rebroken, and being again put into the vat, is managed in the manner now deſcribed, and repeated while, by uſing ſuch means, a drop of whey can be extracted. The curd being now almoſt

fineneſs, it is again returned into the cheeſe-tub, when it is ſcalded, by pouring over the broken curd a pailful of hot water, or of whey, or of whey and water mixed. After the ſcalding water or whey is applied, the whole is briſkly ſtirred, and being allowed to ſtand for ſome time for the curd to ſettle at the bottom of the tub, the ſcalding materials are ſkimmed or poured off, and the curd being preſſed as before, ſo that no more whey can be extracted by ſuch means as were formerly uſed, it is put into the vat, and preſſed in the ordinary way.

moſt entirely freed from the whey, is again placed in the vat, a clean cloth having been previouſly ſpread for the purpoſe of receiving and incloſing it. The curd now takes the form at leaſt of cheeſe, and the cover of the vat being laid on, it is placed in the cheeſe-preſs.

Management of Cheeſe in the Cheeſe-Preſs.—When the vat is properly placed in the preſs, the ordinary degree of preſſure is applied, which is more or leſs according to the ſizes of the cheeſes uſually made. At all large dairies, there are two or three preſſes, all varying in reſpect to weight or preſſure. As ſoon as the vat is placed in the preſs, and the weight applied, ſkewers are again thruſt in through the holes in the ſide of the vat; this is done repeatedly during the firſt day the vat is in the preſs. From the time the vat is firſt placed in the preſs, till it is again taken out, does not, in ordinary caſes, exceed two or three hours. When taken out, the cheeſe is put into a veſſel with hot whey, with a view of hardening its coat or ſkin, where it ſtands for an hour or two; it is then taken out, wiped dry, and after having remained ſome time to cool, it is covered with a clean dry cloth, and the vat being wiped dry, and the cheeſe replaced, it is again put into the preſs. In the evening, ſuppoſing the cheeſe to have been made in the morning, which is the uſual time, it is again taken out of the vat, and another dry cloth

cloth being applied, it is turned and replaced, what was formerly the upper becoming now the under ſide. In this manner, it is taken out, wrapped in clean cloths, and turned in the vat twice a-day, for two days, when it is finally removed.

The Method of ſalting Cheeſe,—Is the next particular of management in the order of deſcription. The cheeſe, on being for the laſt time taken out of the vat, is carried to the ſalting houſe, and placed in the vat in a tub filled to a conſiderable depth with brine, in which it ſtands for ſeveral days, being regularly turned once at leaſt every day. The vat is then removed from the brine-tub, and the cheeſe being taken out, is placed on the ſalting bench, where it ſtands for eight or ten days, ſalt being carefully rubbed over the whole every day during that period. When the cheeſe is of a large ſize, it is commonly ſurrounded with a wooden hoop, or fillet of cloth, to prevent renting. After it is ſuppoſed to be ſufficiently ſalted, it is waſhed in warm water or whey, and when well dried with a cloth, is placed on what is called the drying bench, where it remains a like period before it is removed to the keeping houſe or cheeſe chamber. In ſome dairies, the new cheeſes are not put in brine, but kept in the vats on the ſalting benches; and after being rubbed with ſalt, and turned in the vats daily for a week

week or ten days, the vats are removed, and the cheeſes managed in the manner above mentioned. In ſeveral other dairies, again, the cheeſes are ſalted while the operation of preſſing is performing. At every time they are taken out of the preſs for the purpoſe of being turned in the vats, they are well rubbed with ſalt, which for ſmall thin cheeſes, ſuch as are commonly made in Wilts and Glouceſter ſhires, is found to be ſufficient; and therefore, when taken for the laſt time from the preſs, in place of any more ſalt being applied, they are ſet at once on the drying benches. In ſhort, the practice of immerging new made cheeſe in brine is only adopted when they are of ſo large a ſize, that rubbing ſalt on the outſide would not be ſufficient for anſwering the intended purpoſe.

Management in the Cheeſe-room.—When the cheeſes are properly ſalted, and have acquired a competent degree of dryneſs, they are carried from the ſalting place to the cheeſe-room, or ſtore-houſe; where, after being ſmeared with freſh-butter, they are laid on the floor, or on ſhelves erected for the purpoſe. For the firſt ten days or a fortnight after they are placed in the ſtore-room, they are pretty ſmartly rubbed every day, and the ſmearing with butter repeated; and although after that period it is only neceſſary to rub them two or three times a-week, yet they ſhould be turned every day while in the

the dairy-man's poſſeſſion, which is longer or ſhorter according to the ſeaſon of the year, and the demand at the principal markets.

The produce of a dairy of cows where the milk is converted into cheeſe, is very variouſly ſtated. In ſome diſtricts, two hundred weight and a half from each cow, whether a good or bad milker, if at all in milk, is conſidered a good return. In others, the average runs as high as three; and in the county of Wilts in particular, from three and a half to four is the uſual quantity.

From accurate calculations made by Mr Marſhall, and theſe ſeveral times repeated, he found, that in Glouceſterſhire about fifteen gallons of milk were requiſite for making little more than eleven pounds of two-meal cheeſe, and that one gallon of new milk produced a pound of curd.

It is the general opinion of dairy-farmers, that the produce of from two and a half to three and a half acres, is neceſſary to maintain a cow all the year round. Taking, therefore, the medium of the three averages of cheeſe above mentioned, (amounting to 355 lb. from each cow), the quantity of cheeſe by the acre is 118 lb. Every calculation of this kind, muſt be admitted to be extremely vague and uncertain. The correctneſs of the one now ſtated is, however, to a conſiderable degree, confirmed by Sir William Petty's ſtatement, in regard to the quantity of milk

milk which he ſuppoſed the cows in Ireland yielded in the year *, *viz.* for ninety days three gallons, for other ninety days one gallon, for the next ninety days a quarter of a gallon; and for the remainder of the year none; making in all three hundred and eighty-four gallons; which, conſidering that in every dairy a certain ſhare of cream is abſtracted before the milk is put into the cheeſe-tub, may be ſuppoſed, when converted into one meal, or two-meal cheeſe, to make little more or leſs than 355 lb. as above ſtated.

In addition to the preceding account, which, it is believed, is a pretty accurate ſtatement of the method adopted for making cheeſe in ſome of the beſt managed dairies in the iſland, the reader will not be diſpleaſed to find ſubjoined directions for making two ſorts of cheeſe not common, *viz.* Parmeſan and Stilton; the one in great repute over Europe in general, and the other in Great Britain in particular.

DESCRIPTION of the Method of making PARMESAN CHEESE, as practiſed by SIGNIOR MOSCHATE, near Milan in Italy.

" At ten o'clock in the morning, five brents and " a half of milk, each brent about forty-eight " quarts,

* Sir William Petty's Political Anatomy of Ireland, p. 51. and 52.

" quarts, was put into a large copper, which " turned on a crane, over a ſlow wood fire, made " about two feet below the ſurface of the ground; " the milk was ſtirred from time to time; and " about eleven o'clock, when juſt luke warm, or " conſiderably under a blood-heat, a ball of ren- " net as big as a large walnut, was ſqueeſed " through a cloth into the milk, which was kept " ſtirring. By the help of the crane the copper " was turned from over the fire, and let ſtand " till a few minutes paſt twelve; at which time " the rennet had ſufficiently operated. It was " now ſtirred up and left to ſtand a ſhort time. " Part of the whey was then taken out, and the " copper again turned over a fire ſufficiently " briſk to give a ſtrongiſh heat, but below that " of boiling. A quarter of an ounce of ſaffern " was put in to give it a little colour; but not " ſo unnaturally high as ſome cheeſes in Eng- " land are coloured; and it was well ſtirred from " time to time. The dairy-man frequently felt " the curd. When the ſmall, and as it were the " granulated parts felt rather firm, which was in " about an hour and a half, the copper was ta- " ken from the fire, and the curd left to fall " to the bottom. Part of the whey was taken " out and the curd brought up in a coarſe cloth, " hanging together in a tough ſtate.

" It was put into an hoop, and about an half " hundred weight laid upon it for about an " hour;

" hour; after which the cloth was taken off, " and the cheeſe placed on a ſhelf in the ſame " hoop. At the end of two, or from that to three " days, it is ſprinkled all over with ſalt; the " ſame is repeated every ſecond day for about " forty or forty-five days, after which no further " attention is required. Whilſt ſalting, they ge- " nerally place two cheeſes, one upon another; " in which ſtate they are ſaid to take the ſalt " better than ſingly.

" The whey is again turned into the copper, " and a ſecond ſort of cheeſe is made, and after- " wards even a third *."

The cream-cheeſe, ſo generally known by the name of Stilton †, is made in Leiceſterſhire, and in very conſiderable quantities. Cheeſes of this deſcription were firſt made by a Mrs Paulet, near Melton-Mowbray. They acquired the name of Stilton cheeſe, from the following incidental circumſtance. A brother of Mrs Paulet kept an inn at Stilton, whom ſhe ſupplied with cheeſe. Stilton, from being ſituated on the great north road from London to Edinburgh, is of.

* Bath Society Letters and Papers, Vol. vii. p. 63.

† Stilton is a ſmall village in Huntingdonſhire. The pariſh is in the open-field ſtate; the ſoil of a very indifferent quality; and neither the tillage nor the paſture fields in ſuch order, as to merit commendation.

of courſe a very great thoroughfare; and this landlord's cheeſe being ſuperior to any that his gueſts ever taſted before, ſcarcely a traveller with money in his pocket paſſed through, that did not purchaſe one or two. The character of this ſort of cheeſe having been by this means generally eſtabliſhed, and Stilton being for a long time the only market at which they could be purchaſed, they became known by the name of Stilton cheeſe.—The following is the method of making them, as practiſed in Leiceſterſhire, and as deſcribed in the Agricultural Report of that county:

"Take the night's cream and put it to the "morning's new milk with the rennet; when "the curd is come, it is not to be broke, as is "done with other cheeſes; but take it out with "a ſoil-diſh altogether, and place it in a ſieve to "drain gradually; and as it drains keep gra-"dually preſſing it, till it become firm and dry; "then place it in a wooden hoop; afterwards "to be kept dry on boards, turned frequently, "with cloth binders round it, which are to be "tightened as occaſion requires."

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SECTION V.

General Obſervations on Dairy-Huſbandry; the Methods of feeding Cows, &c.

WHICH of all the branches of dairy-huſbandry above deſcribed, are upon the whole moſt profitable, is of little moment to have determined. Some of them can only be carried on with advantage, where the ſituation of the farm is peculiarly favourable in regard to market; while the others, (if the butter be ſalted, and become an article of commerce, as it generally does), may be eſtabliſhed in any county in the iſland.

Which of the two great branches, butter or cheeſe, when the dairies are under ſimilar good management, returns moſt profit to the farmer, ſeems, upon the whole, a very doubtful point. The valuable part of the milk is in either caſe completely extracted; but although the produce ſells at very different prices, the value as ſtated in the appendix to the Agricultural Report of Mid-Lothian, is very much on a par, amounting, whether of butter and butter-milk, or of cheeſe and whey, to very nearly fourpence halfpenny for the gallon of milk. This, at Sir William Petty's calculation of the average quantity of a cow's milk by the year, as before ſtated, makes

makes the groſs value of the milk of an ordinary cow, when managed in a proper manner, amount to L. 7, 4 s. *per annum*; a ſum which, as a general medium, the writer, from various calculations, is ſatisfied, is neither greatly above nor below what ought to be ſtated.

The number of cows kept on farms of an ordinary ſize in England, where butter and cheeſe are made for ſale, that is, on ſuch as may be properly denominated dairy-farms, is from twenty to thirty, or forty. On dairy-farms called large, the number increaſes from upwards of forty or fifty to above a hundred; and there is an inſtance or two in Somerſetſhire, where it amounts to two hundred.

When ſuch numbers as theſe are mentioned, dairy-huſbandry, as practiſed in Scotland, ſinks into inſignificance; there being comparatively very few inſtances where above ten or twelve cows, that are uſefulfor the dairy, are to be found in the poſſeſſion of a farmer in that kingdom.

Why ſo many diſtricts in England ſhould be remarkable for making good cheeſe, and that there is only one in Scotland in any degree noted for excellency in that art, may to ſome appear remarkable. The Scotch farmers, it is well known, are not deficient in general knowledge, nor in enterprize; nor are the paſtures in that country ſo much inferior to thoſe in England, where the beſt cheeſes are made, as to create

create ſuch a difference in the quality. The richeſt paſtures, in England, are not the beſt on which to eſtabliſh cheeſe-dairies. On the contrary, it is univerſally acknowledged, that the beſt cheeſe is in common made from poor, cold, wet, and comparatively unproductive lands.

That being the caſe, it might be difficult to account for the almoſt total neglect of the eſtabliſhment of dairies for making cheeſe in Scotland, were it not known, that the demand for that article is not in that country ſo conſiderable, as to induce farmers of opulence and ſkill to devote their attention to that object.

The peaſantry and labouring people, although they live in general much better than they did formerly, have not as yet, like that claſs of people in England, got into the uſe of cheeſe as a general article of food; till that happen, the demand can never become conſiderable; and without a demand, it is in vain to ſuppoſe that farmers will give up ſuch branches of huſbandry as afford them ſuitable returns for their labour and expence, for others which, under the exiſting circumſtances, cannot poſſibly be rendered ſo productive.

The management of a dairy, it will readily be inferred from the preceding account, is a buſineſs in which no perſon ought to engage, who is not capable of beſtowing the moſt mi-

nute attention to every particular connected therewith; as without that becomes a fixed and eſtabliſhed principle in the farmer's mind, the chance that ſucceſs will attend the undertaking is at beſt but precarious and uncertain.

Beſides the particulars neceſſary to be attended to in the management of a dairy, and which have already been taken notice of in the courſe of the preceding detail, ſome others, in regard eſpecially to the management of the cows, naturally fall under conſideration. Theſe, however, may be ſhortly ſtated.

If, as there is every reaſon to believe, the cows that give the greateſt quantity of milk are not always the moſt profitable for the dairy, it ought to become more the ſtudy of the dairy-man to purchaſe cows famous for the quality rather than the quantity of milk they yield. If the milk of a cow that gives ſix gallons in the day produce as much butter or cheeſe as that of another which gives eight, it is evident, as hinted before, that the groſs value is the ſame, while the fourth of the labour, a material article, is ſaved.

It is of great conſequence to the produce of a dairy, that the cows ſhould not drop their calves too early in the ſeaſon. When that happens, they fall off in the quantity of milk at the period (autumn) when, owing to its ſuperior richneſs, it is more valuable than at any other. From the

the end of March to the end of April, is the beſt time that a cow can drop her calf; ſhe ſoon gets into good condition on the early graſs, and will yield a greater quantity of milk in the courſe of the ſeaſon, than thoſe that calve either conſiderably earlier or later.

In the management of cows in ſummer, there is a ſameneſs everywhere prevalent. They are kept on the oldeſt paſtures on the farm. When theſe are at a diſtance from the farm-houſes, they are milked on the paſtures; but otherwiſe they are brought home morning and evening for that purpoſe. In winter the dry cows, that is, ſuch as do not give milk, are fed on ſtraw in the ſtraw-yard; while thoſe that are in milk, or are near calving, are kept in ſome incloſed paſture, or in ſheds erected for the purpoſe, and maintained chiefly on hay. Where turnips, cabbages or potatoes, are cultivated on a large ſcale, the milch-cows have a daily and regular allowance of one or other of theſe ſorts of food during the winter and ſpring months. Potatoes in particular, are admirable food for cows; as, while they tend to keep them in good condition, the quantity of milk is generally abundant and of good quality, both in reſpect to richneſs and flavour.

In ſhort, the dairy-farmer, in every part of the iſland, will find it for his intereſt to be attentive to feeding

feeding his cows, eſpecially thoſe that are in milk; for, according to an old Scotch ſaying, "Cows give milk by their heads;" or in other words, if the beſt cows be ſtinted in their food, or otherwiſe miſmanaged, the quantity of milk will ſoon decreaſe.

CHAP.

CHAPTER XXIII.

Removing Obſtacles to the Introduction of Improved Cultivation, as Stones, Furze, Broom, &c.

"WE may talk what we pleaſe," ſays Cowley, "of titles and lions rampant, and "ſpread eagles in fields d'or or d'argent: But "if heraldry were guided by reaſon, a plough "in a field arable would be the moſt noble and "ancient arms." Were that the caſe, the farmer, who by incloſing, draining, and other means, had converted the greateſt extent of land from a waſte and unproductive ſtate, to the uſeful purpoſes of cultivation and paſturage, would be deemed entitled to the higheſt honours of the ſtate.

Be that as it may, it will be univerſally allowed, that by incloſing and draining, and means ſuch as theſe, the real riches of a ſtate can be moſt effectually increaſed. By theſe only can a ſolid foundation be laid for improvements in agriculture, and the breeds of the different

ſpecies of live-ſtock; for the eſtabliſhment of manufactures and commerce; and for the ſupport of an increaſed population. That man, therefore, who is aiding in effecting theſe great national improvements, will be conſidered by the cool and diſpaſſionate reaſoner, as a more uſeful and valuable member of the community, than him who conquers and who deſolates provinces.

Had not the lands of theſe kingdoms been partially incloſed, drained and improved, what at this day would have been the ſtate of agriculture, manufactures, commerce and population? The anxious inquirer in either kingdom may ſatisfy himſelf, without being obliged to have recourſe to the inhabitants of the other for information. Let the Engliſhman aſcertain the extent and value of the produce of an incloſed pariſh, beyond that of one ſimilar in ſoil and ſituation, cultivated in the open-field ſtate; and let the Scotchman examine to what degree the general management of a well improved farm exceeds, in reſpect to national, as well as private emolument, one where the ancient ſyſtem of infield and outfield remains eſtabliſhed; having done ſo, they may reſpectively form ſome idea of the advantages that have reſulted from ſo many intelligent men in the former, as well as in the preſent times, having devoted their time, their capital, and their attention, to the improvement of the ſoil. Then, alſo, they will be ſatisfied, how much it is the indiſpenſable

diſpenſable duty of the executive governments of this, and of every other country, to encourage, as far as in their power, the uſe of ſuch means as are beſt calculated to lay that only foundation (improved agriculture) on which the ſuperſtructure of manufactures, commerce, and increaſed population, can be erected with propriety.

Practical experience is beyond all doubt the beſt teacher; but it does not thence follow, that a farmer, who is about to undertake the improvement of a farm, cannot acquire uſeful information from the communications of others. Although the knowledge which he derives in conſequence of practice muſt be more uſeful to himſelf than to others, in ſo far as it is of a local nature; yet the advantage which a farmer poſſeſſes, who is acquainted with the practice of other diſtricts, over him, who, becauſe he knows no better, continues to trudge in the old beaten track of his forefathers, muſt at once be obvious. Could it be ſuppoſed, that the peruſal of a detailed account of the practice of particular individuals, who had acquired reputation, in conſequence of the great ſucceſs attending their various operations of draining, incloſing, *&c.* would not be beneficial to others; it would follow, that every improving farmer muſt chalk out a line of conduct for himſelf; the expence, labour, and length of time neceſſary for improving an extenſive farm being ſo great, that the inſtances

are

are rare, where the ſame perſon engages more than once in undertakings of this nature.

Few men can of themſelves, and from practice only, acquire that degree of knowledge, even in the courſe of a long life, which they may become poſſeſſed of by comparing the practices of different diſtricts. By doing this, they may, with a due attention to the particular circumſtances in which they are individually placed, reſpecting ſoil, climate, &c. form a rule whereby, on more eſtabliſhed principles, to regulate their own. It was formerly hinted, how much it would be in favour of the agriculture of theſe kingdoms, were the more uſeful practices of particular diſtricts made generally known in others. Nothing would ſo effectually do away the rooted prejudice in favour of ancient cuſtoms, ſo prevalent, eſpecially among the middling and lower ranks of farmers;—a prejudice foſtered by ignorance, and which can only be removed by ſuch an increaſe of knowledge, that while the mind ſhall be better enabled to judge, it will alſo be led naturally to decide with more impartiality, in conſequence of its becoming gradually leſs fettered by the predilection, which in its ſtate of ignorance it poſſeſſed, for what it was habituated to conſider practices ſuperior to every other.

Conſidering the means by which lands may be improved as one of the moſt important ſubjects connected with agriculture, and being fully

ly ſatisfied, that farmers in particular diſtricts may derive great advantage from a knowledge of the practices adopted in others, the writer ſhall uſe his endeavours to deſcribe, as perſpicuouſly as poſſible, the benefit that may be expected to reſult from adopting all or any of the means of improvement above ſuggeſted. He ſhall alſo point out minutely the different ways in which lands are incloſed, drained, flooded, *&c.* in theſe kingdoms; ſo that the unexperienced farmer, it is hoped, will be enabled to derive ſome information from a peruſal of the following pages.

Lands that have been long imperfectly cultivated, are often not only encumbered with weeds, but frequently with ſtones, furze, *&c.* which require to be removed, before new and better methods of management can be adopted with ſucceſs. Before a field can be incloſed and drained, the ridges ſtraightened and levelled, and the ſoil well cultivated, and completely freed from weeds, the improving farmer will find it neceſſary to remove the large ſtones, and the buſhes of furze, broom, brambles, *&c.* where they abound, in order to give full effect to the operations of the plough and the harrow, and of courſe theſe objects will firſt attract his attention.

Of theſe impediments to good cultivation, large ſtones, when partly or wholly covered by the ſoil, but not to ſuch a depth as to allow the plough

plough to paſs over them, are the moſt difficult and expenſive to remove. When theſe abound, which is frequently the caſe in elevated diſtricts, particularly in the Highlands of Scotland *, the expence of improving a farm is greatly augmented, and the undertaking becomes no leſs tedious than troubleſome.

The uſual method of clearing land of large ſtones, is by boring, and afterwards blowing them to pieces by means of gunpowder. Theſe operations are performed by people who are bred to the buſineſs, and who contract at a certain rate *per* inch, according to the nature and hardneſs of the ſtone, and whether the gunpowder be furniſhed by the employer or the operator. A penny the inch is the common price when the employer furniſhes the gunpowder. The bore, which is about an inch in diameter, and from ſix to ten or ſixteen in depth, in proportion to the ſize of the ſtone, is made by ſtriking an iron rod, called a jumper, with a hammer, againſt one particular

* In the Highland parts of the counties of Perth and Aberdeen, where the teams are weak, and the farmers more remarkable in general for indolence than activity, it is the common practice for the plough-boy to take hold of the horſes bridles or halters, and, walking backwards, to guide the plough round the large ſtones. This he does with as much care and ſtudied attention, as ever pilot ſteered a veſſel driven among rocks.

particular part of the ſtone, whereby a certain portion of it is levigated, or reduced to a powdery ſubſtance, at every ſtroke; and by applying now and then a ſmall quantity of water, the operation is greatly facilitated. The bore having been made to the ſuppoſed requiſite depth, the borer, after having taken out all the powdery ſubſtance, fills the bore to a certain depth with gunpowder; and having put down a ſmall iron rod, which being afterwards withdrawn, leaves an opening that anſwers the purpoſe of a touch-hole, he fills the remaining part of the bore with chips of ſtone, which he rams in as hard as poſſible with the rod and hammer. The ſmall iron rod being then withdrawn, and gunpowder poured into the hole, and a little ſpread on the top, he places a piece of match in ſuch a poſition, as when nearly burnt out will ſet fire to the powder on the top; and having lighted it, he makes his eſcape to a proper diſtance before the exploſion take place.

The ſtone, which by this means is made eaſily portable, is chiefly uſed, when there are great numbers on a field, in building fences, and the ſmaller pieces in forming drains. When thus applied, although the expence is much greater than that attending the ordinary mode of quarrying ſtone, yet, conſidering the double purpoſe that is anſwered, *viz.* clearing the field, and furniſhing materials for incloſing and draining it

at the ſame time, it does not occur, that any other better, or leſs expenſive method could be adopted for clearing a field of theſe incumberances. It frequently, however, happens, that the removal of large ſtones is neceſſary, while none of the other purpoſes can be anſwered thereby. In ſuch caſes, the expence of clearing a field becomes much more conſiderable. To farmers ſo ſituated, it may not be improper to recommend a machine mentioned, although not accurately deſcribed, in the Scots Farmer, Vol. i. p. 197. which, if uſed, would on many occaſions ſave both the tedious labour of boring, and the expence of gunpowder: It is nothing elſe than applying the lever, the uſe of which, in moving dead weights, is pretty well known to every common mechanic and labourer. The lever is ſupported by three poſts ſet in a triangular form, in the manner uſed for hanging a balance or ſteelyard, when hay or other bulky articles are weighed. Ropes or chains being put round the ſtone, and afterwards made faſt by a hook to one end of the lever, the ſtrength of two or three men is applied to the other. The ſtone being by this means ſuſpended, the ſledge or carriage is drawn under it, when it is lowered and placed on the carriage with great eaſe and expedition. The ſimplicity of this contrivance cannot be exceeded; and as it muſt neceſſarily prove effectual in a great many caſes, it merits the improving

ing farmer's attention. The writer has on many occaſions ſeen five or ſix men employed for an hour or two in carting a large unwieldy ſtone, which, had the lever been applied in the manner above mentioned, might have been done in much ſhorter time, and with fewer hands. There is ſtill another method uſed in various parts of both kingdoms for removing large ſtones, when they are ſo ſituated as to obſtruct the plough; that is, by digging pits and ſinking them. This is ſo ſlovenly a way of doing the buſineſs, as ought not to be recommended. Beſides the expence, which is conſiderable, it is alſo often attended with another bad conſequence, that of mixing the ſoil with perhaps the worſt ſort of ſubſoil, by which the quality of the former is greatly injured.

Furze, broom, brambles, &c. are ſhrubs that grow naturally on almoſt all the unimproved lands in theſe kingdoms, and to ſuch a degree, in many places, as renders it very trubleſome and expenſive to extirpate them. The common method is to grub them up with the hoe or mattock. This is done with more or leſs attention, according to the means intended to be afterwards uſed for reducing the lands to a proper ſtate of cultivation. When it is propoſed to fallow the field, the largeſt of the roots only are grubbed up; and when that is done, it is ploughed with a plough drawn by four or ſix

ſtrong oxen or horſes. The greateſt part of the remaining roots are torn up by the firſt ploughing, and the buſineſs completely effected by croſs-ploughing the field on the next occaſion. The furze, broom, &c. are commonly carried off for fuel; and the ſmall roots being collected together in heaps, are conſumed to aſhes on the field.

In many parts of England, the uſual means adopted for bringing waſte, or hitherto uncultivated lands into tillage, is by paring and burning the ſod. Where theſe ſhrubs grow on commons, or waſtes that are propoſed to be improved in this way, the roots muſt be grubbed up with more attention than is neceſſary in the former caſe, otherwiſe the paring ſpade cannot be uſed with effect.

In either caſe, when furze or broom are ſtrong and cloſe, and when they grow in a country where fuel is ſo plenty that they are unſaleable for that purpoſe, it would reduce the expence of grubbing, and greatly leſſen the labourer's trouble, to ſet fire to them before hand; and as froſt has a very great effect in withering theſe ſhrubs, and in rendering them more combuſtible, the beſt ſeaſon for burning them before grubbing is during a ſevere froſt in winter.

CHAP.

CHAPTER XXIV.

The Various Methods of Incloſing adopted in Great Britain.

IN England there are bars to incloſing which the Legiſlature only can remove, but which, being never in any caſe done, without loading the proprietors with an unmeaning uſeleſs expence, this ſpecies of improvement, important as it certainly is, goes on in many parts of that kingdom but very ſlowly. In Scotland, although every proprietor is at perfect freedom to incloſe and improve his eſtate in the way which he conſiders likely to prove moſt beneficial, provided he do not thereby injure that of his neighbour; yet, in the northern diviſion of the country, incloſing is leſs thought of, except on the farms poſſeſſed by the proprietors, than in any other part of the iſland.

The advantages reſulting from incloſing are ſo great and numerous, and at the ſame time ſo evident, that it has been long matter of ſurpriſe to

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ſee gentlemen, with the utmoſt eagerneſs, adding eſtate to eſtate, and field to field, while they could have expended their money to greater advantage, and with much better effect, in incloſing and improving thoſe of which they were formerly poſſeſſed. From the conduct of many proprietors in Scotland, one would be apt to conclude, that not a well paid rent, or the improvement of the country, but extenſive territory, was the object of their ambition. They ſeem not to have conſidered, that L. 1000 a-year paid from 1000 acres of well managed land, is a more certain revenue, and collected at leſs expence, than a like ſum from three times the extent in an imperfect ſtate of cultivation.

Among the advantages derived from incloſing, that of aſcertaining and ſecuring the extent of the property is not the leaſt conſiderable. The many expenſive, tedious, and vexatious litigations that are frequently carried on in Scotland, with a view of determining the boundaries of an open-field eſtate; not to mention the numerous prevarications and perjuries that often take place, when the tenants of the one eſtate are brought forward to prove facts, which it is not for the intereſt of the landlords and tenants of the other to have eſtabliſhed, might be almoſt ſufficient to induce proprietors in that country to incloſe their lands. But ſtronger reaſons occur; incloſing not only ſecures the property of the

the ſoil, but alſo its produce. In former times, the ſecurity which a man poſſeſſed over the produce of his fields, depended on the extent in which that produce, of whatever nature, was intermixed with that of others. The caſe is now greatly changed. The eſtabliſhed laws of this country, when duly adminiſtered, are found ſufficient for the protection not only of the perſons, but of the properties of individuals; and although inſtances do happen where neither are ſecure from the effects of ſuperior influence, where, although an individual is now and then cruſhed, and the moſt valuable of all the different ſorts of property he can poſſeſs, "his good "name," attempted to be wreſted from him by the degenerated repreſentative of ſome ancient feudal lord, yet the inſtances are rare; and fortunately, when any ſuch occur, the impartial public never fail to ſtamp the character of the chief actor in the ſcene, however reſpectable for birth, title, or fortune, with cowardice, ignominy, and contempt. Every man's incloſed field is now conſidered like his caſtle, a place of ſecurity, in which his live-ſtock, his corns, his hay, or his implements of huſbandry, may be depoſited without riſk of embezzlement; whereas till a farm be incloſed, the farmer cannot be ſaid to be in full poſſeſſion of it. Let him be as careful and attentive as he may, injuries are committed to his crops by his horſes, cattle, or ſheep,

ſheep, while his fields are daily expoſed to the depredations of all around. Incloſing, therefore, to all its other advantages, adds that of ſecuring to the rightful owner the benefits that reſult from ſuperior labour, attention and induſtry.

Shelter is another good conſequence ariſing from incloſing. In proportion as a field or a country is bleak, naked, and expoſed to chilling blaſts and winter ſtorms, in the ſame proportion will it be unproductive, compared with lands more favourably ſituated. Incloſing is a mean of obtaining, by art, a certain degree of that genial warmth ſo eſſential to the production of valuable crops, but which nature is not always pleaſed to beſtow. "The warmeſt air," ſays a late provincial writer on agriculture *, "lies "neareſt the ſurface of the earth, being that "portion of the atmoſphere, which, like a blan-"ket, nature ſpreads over the ſoil and its pro-"ductions; and hence fences of all kinds tend "more or leſs to prevent ſuch a valuable cover-"ing from being blown off by the winds." The beneficial effects of incloſing, whether the lands are to be occupied chiefly in tillage or paſture, are evident to the meaneſt capacity. Every day's experience proves, that where grounds are ſheltered from the violence of ſtorms, as by garden

* See Mr Robertſon's ſecond edition of the Preſent State of Agriculture in Mid-Lothian, p. 77. Note.

garden-walls, or by plantations of foreſt trees, they are more productive, and vegetation is earlier than in others ſimilar in every reſpect, unleſs in regard to expoſure. How many inſtances occur to eſtabliſh this fact, in reſpect to large fields, as well as to gardens, orchards, &c. Let the obſervant farmer, who poſſeſſes an incloſed farm, examine that part of a field where, owing to the decay of the fence, the wind enjoys a free paſſage, and he will be ſatisfied of the benefit of incloſing, from the ſuperiority of the crop in the other part of the field over that which is within the influence of this additional expoſure. While, on the other hand, the poſſeſſor of an open field farm, by examining the ſuperior verdure that takes place in any part of an open field that is by ſome accidental circumſtances ſheltered in a remarkable degree, may ſatisfy himſelf, that were the whole equally ſheltered the produce would be more abundant. Beſides the additional quantity of herbage which may, for the reaſons above mentioned, be expected on incloſed fields, beyond what open fields of the ſame quality of ſoil produce, the benefit which live-ſtock enjoy from the ſhade afforded by the fences in ſummer, and the ſhelter in winter, are of the greateſt importance. If a perſon go into an incloſed field in queſt of any ſpecies of live-ſtock, during the heat of a ſummer-day, he is ſure to find them repoſed at their eaſe under

the ſhade of ſome ſpreading tree, or of the fence, whether of thorn or of ſtone. If, again, they be ſought for during a ſevere winter blaſt, they will be found crept together as cloſe as poſſible, and in the moſt ſhetered corner of the whole incloſure. If any perſon entertains doubts reſpecting incloſed paſtures being better adapted for rearing and fattening live-ſtock than open fields, he may eaſily ſatisfy himſelf, by comparing the live-ſtock in an incloſed pariſh in England with that of one in the open-field ſtate. The writer is much miſtaken if he will not find them, in the latter, not only fewer in number, but each animal, on an average, 30 or 40 *per cent.* inferior in value. In ſhort, incloſing may be denominated the firſt ſtep towards effecting improvements in the breeds of the different ſpecies of live-ſtock. This is reaſoning on plain eſtabliſhed facts, and on ſuch as afford the moſt indubitable evidence of the ſuperiority of incloſed fields, whether for tillage or paſturage. Were farther proof neceſſary, the additional rent which is every where paid for incloſed land, beyond that paid for land of an equal quality in the open-field ſtate, is ſufficient to place the matter beyond all poſſibility of doubt. The increaſe in the value of incloſed land, either in property or leaſe, depends ſo much on the quality of the ſoil, and the mode of management afterwards adopted, that it is difficult to ſpecify any particular

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ſum by the acre to which the rent may be advanced, by adopting this mean of improvement. Lands of a middling quality, good turnip ſoil, for inſtance, is probably benefited to a greater degree by incloſing, than thoſe of ſuperior or inferior quality. Lands of this deſcription, in the open-field ſtate, may be conſidered as rented to the full at 15 s. the acre, whereas there are few inſtances where ſuch lands, when incloſed, are rented under 20 s.; an advance ſo great as to afford the proprietor a handſome profit after paying the intereſt of the money expended. Thus, not only does incloſing increaſe the quantity and quality of the produce, ſo as to enable the farmer to pay his landlord a higher rent, and to contribute a larger ſhare to the revenues of the State, but from ſo many people being conſtantly employed in making and repairing the fences, incloſing in this view alſo muſt be conſidered beneficial. Many other advantages might be mentioned, as reſulting from adopting this mode of improvement; but what is already ſtated appears ſufficient to impreſs every unprejudiced perſon with the fulleſt conviction, that if there did not exiſt obſtacles of a public or private nature, a much greater portion of the arable lands of Great Britain would have been long ſince incloſed, and a more extenſive foundation thereby laid for the general eſtabliſh-

ment of agricultural and other national improvements

When a proprietor or farmer adopts the reſolution of incloſing an eſtate or a farm, there are ſeveral particulars that merit conſideration before the undertaking be actually commenced. The moſt material are, the form and ſize of the incloſures, and the materials of which the fences ſhould be compoſed.

Modern improvers have altered materially the form of incloſures from that moſt generally adopted in former times. This, it is ſuſpected, however, may rather be called an alteration than an improvement. Although the old incloſures have not that regularity to recommend them, in point of general utility they may ſtand in competition with the ſtraight formal lines which ſeem ſo eſſential in the opinion of thoſe who have made the greateſt deviations from the ancient rules of forming lines of diviſion. The writer does not ſuppoſe, that all the people who incloſed lands in theſe kingdoms ſome centuries ago, acted on the ſame principles which regulates the conduct of the farmers in ſome of the counties of Wales; namely, that the more crooked the fences are formed, they will afford the more ſhelter *; yet he is ſatisfied they were more correct in reſpect to the direction or line of

* See Report of the Preſent State of Agriculture in the County of Brecknock.

of the fences, than many of thoſe who may be called the great improvers of the preſent day. The old fences were planned with a view chiefly to incloſe ſoils as ſimilar as poſſible within each diviſion; beauty or regularity does not ſeem to have attracted much of the proprietor's or farmer's attention; utility, it would appear, they kept principally in view. Our modern improvers, on the other hand, in too many inſtances at leaſt, ſhew an evident diſpoſition to ſacrifice utility to taſte and regularity in appearance. Hence, it is not uncommon in a new incloſed pariſh in England, or even in an eſtate in Scotland, where the proprietor has the ſole power of management, to ſee ſeveral different ſorts of ſoils in the ſame incloſure, which, with proper attention, and a little ſacrifice of taſte, might have been included in the adjoining fields with much greater propriety. Thus, in place of forming the fences in ſuch directions as that the greateſt advantage might have been derived, by not only incloſing and ſubdividing the eſtate, but alſo, by ſeparating, in every poſſible caſe, ſoils of different and oppoſite qualities, it not unfrequently happens, that the ſands of Norfolk, and the clays of Lincolnſhire, are as it were incloſed within the ſame fence; than which it is impoſſible to figure any management more improper. If a regular rotation of cropping be adopted on a farm where each incloſure contains a variety

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of ſoils, it will of courſe be ſuited to that ſort which moſt prevails. When the moſt prevalent ſoil is of a light and ſandy nature, the portions of better ſoil contained in each incloſure, muſt be cultivated under a ſyſtem, in regard to cropping, not the beſt calculated to produce the greateſt returns. On the other hand, when the predominant ſoil is deep and fertile, that of a lighter nature muſt be exhauſted, were a mode of cropping purſued calculated only for the ſoil of ſuperior quality. Whereas, had a judicious arrangement been made in regard to the form of the incloſures, the good and bad ſoils might, in many caſes, have been kept ſeparate, and, as often happens, two rotations of cropping adopted on the ſame farm with equal propriety. Perhaps alſo, fences in ſtraight lines, in place of curves, might be diſputed on the ſcore of taſte; but that is a queſtion foreign to the object of the preſent inveſtigation, which has utility only in view.

The new incloſures differ as much from the old, in regard to ſize, as in form. The old incloſures generally contain from three or four to ſix or eight acres; few of ſuch as can be properly denominated old, exceed ten; while thoſe that have been formed in later times extend from ten or twenty, ſometimes to forty or fifty. This difference in the ſize of incloſures is greatly, if not entirely, owing to the change of opinion

nion in regard to what was, and what now is, conſidered by individuals as the proper ſize of farms. In the ſame, or nearly the ſame proportion as farms were enlarged, ſo were the dimenſions of the new incloſures. The more ancient incloſures, ſuch as thoſe in ſeveral parts of Eſſex, Kent, Suffolk, &c. are evidently too ſmall, while thoſe in many other diſtricts are too large. There is a medium in regard to the ſize of incloſures, as well as in other things; and to diſcover and adhere to it, as nearly as circumſtances will allow, is certainly for the intereſt of the proprietors, the tenants, and the public. Where the incloſures do not exceed three or four acres, the quantity of land taken up in erecting the fences is a very heavy *per centage*, viewing the incloſure as a part of the farm, of the eſtate, or of the national territory; a free circulation of air is alſo prevented, eſpecially if there be hedge-row trees, to ſuch a degree, that it may be difficult to ſay whether the crops are more benefited or injured by the fences, when ſo cloſely placed. As one of the moſt important advantages that can be derived from incloſing is ſhelter, large incloſures muſt, on the other hand, be equally improper. When a tract of thirty or forty acres is included within one fence, it would be abſurd to ſuppoſe that the fence can afford the ſame degree of ſhelter, as if theſe thirty or forty acres had been ſubdivided into three or four fields.

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When the incloſures are made ſo large, the advantage of fencing, in ſo far as regards ſhelter, muſt be merely a ſecondary object with the perſon who erects the fences.

Having pointed out the loſs and inconvenience ariſing from too ſmall, and from too large incloſures, it may be neceſſary to ſuggeſt what, upon the whole, ought to be conſidered the beſt ſize. This the writer propoſes to do from the authority of Mr Bakewell, from whom the Britiſh farmers might have learned many uſeful leſſons on ſubjects connected with huſbandry. Beſides what related more eſpecially to the improvement of the different ſpecies of live-ſtock, it was the opinion of that expert farmer, *that fifty acres of paſture, divided into five incloſures, would go as far in grazing cattle as ſixty acres all in one field.* If there was a man in the iſland that exceeded another in knowledge as a breeder and grazier, it was Mr Bakewell; his opinion, therefore, founded on the experience of many years, may be conſidered as concluſive, in regard to the proper ſize of incloſures, in ſo far as the breeder or grazier is concerned; and from what is above ſtated, it appears that from eight to twelve acre fields are beſt calculated for either of theſe purpoſes. Mr Marſhall alſo, in corroboration of this, hints, in his Rural Oeconomy of Glouceſterſhire, that the moſt experienced dairy-farmers in that diſtrict conſider what he calls

a ſuit of paſtures as a more profitable mode of paſturing cows than one large incloſure.

As no farm can be kept conſtantly in tillage with advantage, and as the beſt mode of cropping that can poſſibly be adopted for the generality of ſoils, is, in the writer's apprehenſion, that by which nearly the one half of the farm is in tillage, and the other in paſture, it is neceſſary, in determining the proper ſize of incloſures, to have regard to the two great branches of huſbandry, viz. grain and graſs. In regard to the latter, ſo far as the practice of the two counties moſt remarkable for grazing and dairying can go, the matter ſeems determined; and in reſpect to corn huſbandry, as middle ſized incloſures enjoy the advantage of ſhelter to a greater degree than thoſe of larger ſize, and a more free circulation of air than thoſe of ſmall dimenſions, there can be no reaſon to heſitate in determining, that the ſize of incloſures beſt ſuited for the breeder, the grazier, and the dairyman's purpoſes, will alſo beſt anſwer thoſe of the cultivator of grain.

The ſort of fence moſt proper to be erected depends on various circumſtances, as ſoil, ſituation, and the eaſe or difficulty of procuring materials. The two chief materials uſed for fencing in theſe kingdoms are thorns or hedges, and ſtone walls; although others, as will be afterwards more particularly mentioned, are locally adopted.

Thorns will no doubt grow in the generality of ſoils and ſituations; yet there are ſome inſtances where the ſoil is ſo bad, and the ſituation ſo elevated, that they cannot be planted with any probability of ſucceſs. On mooriſh ſoils with a tilly bottom, thorns never thrive. They may be nurſed up to a certain length, by the application of lime, marl, or other forcing manures, but as ſoon as the roots penetrate into the till, the plants begin to canker and fog, and in a ſhort time die. Theſe ſoils, therefore, are of all others the worſt for raiſing hedges; and if to this inferiority of ſoil be added an elevated ſituation, and conſequently a bad climate, an attempt to raiſe hedges under ſuch circumſtances will prove as vain as it is ridiculous. In all ſuch caſes, where materials can be had on reaſonable terms, ſtone walls ought to be preferred; but on the principle that a fence of any kind is better than none, in ſituations where thorns cannot be expected to thrive, and where it is impoſſible to procure ſtone, ſome of the inferior ſorts of fences, after deſcribed, may be ſubſtituted with advantage.

The fences in common uſe in Great Britain are,

Thorn Hedges,
Hedge and Wall,
Stone Walls,
Willows.

Thorn

Thorn Hedges.—Hedges of white thorn are not only the moſt common and the moſt ornamental, but in ſoils adapted for them the moſt uſeful, and, when properly planted, the leaſt expenſive of all fences. There are various methods adopted for planting, protecting and rearing thorns; ſome of theſe, as practiſed in particular diſtricts, ſhall firſt be mentioned; and afterwards, ſuch obſervations as appear likely to prove uſeful to thoſe who may be engaged in planting and managing thorn hedges, in whatever part of the iſland they may be ſituated.

The ordinary method of planting thorns, in ſeveral of the ſouthern parts of England, is the moſt expenſive, in regard to the quantity of land uſually devoted to the purpoſe, that can well be imagined. Thirteen or fourteen feet for each fence is the common allowance; an extent ſo great, as when a whole pariſh is incloſed in this way, muſt create a great deduction in the total number of productive acres. The firſt thing done, as a preparation for planting thorns, is to line out the direction of the intended fence, which is done by marking off two parallel ditches, the neareſt edges of which are made diſtant about ſeven or eight feet from each other. In forming theſe ditches, which are uſually about three feet wide at top, nine or ten inches at bottom, and between two and three feet deep, the earth is thrown on the central ſpace, whereby a kind of

bank or mound is formed, which riſes ſomewhat more than two feet above the original ſurface-ſoil, and is narrowed at the top till three or four feet in breadth. The mound or bank having been formed in the manner now deſcribed, a ſmall trench is made in the middle; and after both the tops and the roots of the plants or ſets are dreſſed and pruned, they are placed in the trench in a reclining poſition, at the diſtance of about three inches from plant to plant, and the roots afterwards covered up with ſome of the fineſt of the earth. On many occaſions, a little dung, lime or marl, is at the ſame time applied; but the practice is by no means general. This method may be both neceſſary and uſeful, where open drains are requiſite for carrying off the ſuperfluous water; but on light, dry, friable ſoils, it muſt be conſidered improper, not only from the circumſtance of ſo much land being occupied, but alſo on account of the ſets of young thorns being liable to be parched, in conſequence of being planted on mounds of dry earth, raiſed ſo much above the general level of the country. Although the method of planting thorns in ſome of the counties of Wales is, upon the whole, pretty ſimilar to that above mentioned, yet it differs in ſome important particulars, which require to be explained. The mound of earth, which is not above four feet broad at the baſe, and ſeldom exceeds two at the top, is not formed till the ſets

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be planted. Theſe are ſelected of the greateſt lengths that can be procured; and being planted in the original ſurface-ſoil, the drains or ditches are dug on each ſide, and the earth thrown into the centre, to form the mound: When the operation is finiſhed, the ſtems or tops of the plants appear eighteen inches or two feet above the ſurface of the mound. This practice of ſetting the roots of the plants ſo deep in the earth, although ſcarcely any where elſe adopted, appears well calculated to do away the objection juſt now ſtated, to planting thorns in mounds, or artificial banks of earth, where the ſoil is of a ſandy nature; as no continuance of dry weather, however ſevere, or of however long continuance, can poſſibly affect the roots of plants ſunk to ſuch a depth in the ſoil; while, at the ſame time, as this practice is by no means uncommon in Wales, there is no reaſon to ſuppoſe that the vigour of the plants is obſtructed by the roots being covered to ſuch a depth.

In the north of England, particularly in Northumberland, a method of planting thorns different from any of theſe is very generally adopted. When the ditches are marked off, a courſe or two of the ſods taken from the adjoining ground, but chiefly from where the ditches are to be formed, are placed on the ſpace allotted for the mound, with the ſward or green ſide downwards: While ſome of the labourers are employed

ployed in throwing the remaining earth from the ditches, others build a wall of ſod on one edge of the mound, to the height of about four feet; and as the looſe earth is occaſionally thrown behind this wall, the mound, when finiſhed, has a triangular form. The ſets of thorns are then planted on the ſlopping ſide of the mound, and about a foot from the former ſurface. This mode of planting has evidently an advantage over the others in one particular, of great importance in an expoſed ſituation, that of the young ſhoots of the plants receiving more ſhelter, in conſequence of being ſet towards the baſe, in place of on the top of the mound. In another reſpect alſo, where drainage is not neceſſary it is ſuperior, as by one ditch only being formed, which is very frequently the caſe, a conſiderable ſaving takes place in the extent of ſurface neceſſary for forming the fence.

The methods of rearing hedges in Scotland are conſiderably different from any of thoſe above deſcribed. The moſt uſual mode is to form one ditch only; it is ſeldom more, except when the ſoil is wet and marſhy, than three feet wide at top, thirty inches or three feet deep, and eight or ten inches wide at bottom; after the firſt ſpit or ſpade depth of earth has been laid as the foundation of the intended mound, the ſets of thorns are placed horizontally, with their ſtems towards the ditch; and a little of the beſt earth being laid over

over the roots, and dung or other manure, when deemed neceſſary, being applied, the remainder of the earth from the ditch is then laid over the whole. In conſequence of making only one ditch, the baſe of the mound does not exceed three or four feet; ſo that about one half only of the ground that is required in England, is taken up in forming a hedge-row in Scotland, which, over an extenſive tract of country, muſt prove a ſaving of no inconſiderable magnitude.

The only other method common in Scotland, is peculiarly adopted to loams, or other dry ſoils; and for ſuch will readily be acknowledged by the intelligent farmer, as ſuperior to every other. It is to plant the thorns in the ſurface-ſoil, without forming a ditch on either ſide. The line of the intended fence, to the breadth of twelve or eighteen feet is fallowed the ſeaſon before; and previous to planting the thorns, the ridge is gathered up once or twice with the plough towards the middle, ſo as to create an additional depth of ſurface-ſoil. The ſets are then planted in a ſmall trench opened for the purpoſe; and being placed at an angle of about 45 degrees, the roots are covered up with earth and dung in the ordinary manner. The ridge is afterwards kept clean for two, three or more years, by planting green-crops, which are repeatedly horſe and hand-hoed. The quantity of ground that a hedge thus planted takes up, is leſs than would be neceſſarily

ceſſarily occupied by any other permanent fence whatever. The expence of hoeing and keeping clean amounts only to a very trifling ſum, while, by a better opportunity being afforded for performing the work completely, the thorns ſhoot up into a fence in a ſhorter period than when planted and managed in any other way.

Having now pointed out the different methods in which thorn-hedges are planted, ſome remarks on the particulars of after management may not be deemed improper.

Reſpecting the management of the plants *in* the nurſery, it is unneceſſary to make any obſervations; the ſowing the ſeeds, and rearing the plants till proper for planting out in the field, being more within the province of the nurſeryman, or the proprietor's gardener, than the farmer. All that the farmer, as planter, has chiefly to beſtow his attention upon, in regard to the plants, is, that they be equal in ſize, well ſkinned, and healthy looking. An equality in the ſize of the plants is of more importance than people are generally aware of; as when ſmall and large ſets are planted promiſcuouſly, the larger or ſtronger plants, by making more vigorous ſhoots, ſoon overtop the ſmall ones, which in conſequence ſoon become ſtinted and die. Negligence in this reſpect is the chief cauſe of the many gaps and breaches which are ſo frequently viſible in hedge-rows, and which might

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be prevented by due attention to ſorting the plants, ſo as that they be as nearly as poſſible of the ſame ſize. Thorns that meaſure about half an inch in diameter, where cut over, by way of pruning, before planting, that is, from ſix to ten inches above the offset of the root, is the beſt ſize for the generality of ſoils; and when clean ſkinned, healthy in appearance, and equal in ſize, there is no reaſon to apprehend, if the hedge ſhould not ſucceed, that the failure is owing to the plants, eſpecially if they have been tranſplanted and properly nurſed before hand. Any of the winter months, if the weather be favourable, are proper for planting thorns; but care ſhould be taken to have the planting finiſhed towards the end of February, or at fartheſt by the beginning of March; as, if the ſeaſon has not been remarkably backward, the ſap begins by that time to aſcend, and the buds to form, after which it would be highly improper to think of moving them from the nurſery. Wherever obſervation has been made in regard to the difference ariſing from planting thorns early in winter, and late in the ſpring, the former period has always been found the beſt. The young ſets, when planted in the early part of winter, not only puſh out more vigorous ſhoots the following ſeaſon, but the hedge becomes alſo much ſtronger, and forms a fence a year at leaſt before that planted late in ſpring.

When

When the ground in which the thorns are to be planted is prepared in one or other of the ways already mentioned, the ſets, when taken from the nurſery, and before planting in the hedge-row, ſhould be properly trimmed and pruned. This part of the planter's buſineſs requires to be performed with a conſiderable degree of attention, as much of the vigour of the firſt ſhoots of the plants, and conſequently of the future ſucceſs of the hedge, depends upon it. The pruning knife ſhould be applied to the roots with more or leſs freedom, according to the ſtate in which they appear. If they be freſh and ſound, the greater number of ſmall fibres that are left, the greater chance there is that the plant will ſhoot out vigorouſly in the ſpring; if, on the other hand, any of the fibres appear withered or decayed, they ſhould be lopped off cloſe to the principal root, and thoſe only allowed to remain that appear in a healthy ſtate. Beſides cutting off any ſuperfluous or decayed fibres, it is alſo common, and, in conſequence of cutting off part of the fibres from the roots, neceſſary, to amputate the ſtem or plant, in order to prevent its becoming afterwards ſtinted. This ought to be performed with a gardener's knife, or other ſharp inſtrument, ſo that it may be done as clean as poſſible; neither the ſkin of the remaining part of the plant being broken, nor too much of the wood remaining uncovered; as in either caſe the plant

is apt to bleed too freely, and to become proportionally exhauſted. The ſets being thus prepared, are placed, either in a horozontal direction, or ſlopewiſe, according to the form of the bank or mound in which they are planted; and afterwards covered, firſt with a little of the fineſt of the mould, and then with the other ſoil, to a moderate depth, leaving the tops of the ſets only an inch or two uncovered *. The diſtance at which the plants are placed from each other, is extremely variable in practice. Sometimes two rows, but more frequently one only, is formed. In the former caſe, the rows are placed about a foot aſunder, and the plants from eight to ten inches diſtant in the rows. In the other, from ſix to ten inches is the common diſtance. When a hedge is kept thoroughly clean for a few years at firſt, and properly trained, planting in one row is a more ſucceſsful method of ſecuring a ſtrong durable fence, than when the ſets are placed in double rows; as the roots of the plants in a double hedge-row are ſo much more numerous, and require ſuch an additional degree

* Of the ſucceſs attending the ſingular method of planting thorns four or five feet in length, and without cutting off the tops, as is common in Wales, the writer is not ſo well adviſed, as to induce him to recommend the practice to the attention of farmers in other diſtricts.

degree of nouriſhment, that it is in very fertile ſoils only where thorns thus planted come to a proper ſize.

There are only two uſual methods of protecting young hedges from the depredations of cattle, or other live-ſtock, that have fallen under the writer's obſervation, *viz.* by poſts and rails, or by temporary fences formed of dead thorns cut from ſome neighbouring hedge-row; both theſe are ſo ſimple, and ſo well known, that a deſcription of the manner of forming either is therefore rendered unneceſſary.

Beſides hoeing and cleaning young hedges, which ought to be performed regularly two or three times in the ſeaſon, for the firſt three or four years, the only other particulars of management neceſſary to be deſcribed, are clipping or pruning, and cutting or plaſhing.

In ſome diſtricts, after the thorns are planted, they are left to nature's charge, no artificial means being uſed to train them up in any particular form. In others, the gardener's ſciſſars are applied with ſo little mercy, not only to the collateral branches, but alſo to the principal ſhoots or ſtems, that the hedge frequently becomes ſtinted in its growth, and dies; or if it ſurvive ſuch ſevere treatment, it would be better adapted for an ornamental ſubdiviſion of a garden, than for confining cattle within a given ſpace. Both theſe modes of management, although

though extremely common, are alſo exceedingly improper. To train a hedge properly requires a conſiderable degree both of judgment and of attention, and is ſeldom performed in a proper manner, unleſs by thoſe who have been regularly bred to the buſineſs. While that formal ſameneſs and affected neatneſs, ſo common about the gardens, parks and pleaſure-grounds of proprietors, would neither tend to the ſtrength, nor to the durability, ſo eſſentially neceſſary in farm-fences, a certain degree of art is at the ſame time requiſite, in training them in ſuch a manner that they may poſſeſs a proper degree of both; as, without ſtrength and durability, they are of very little conſequence to the huſbandman. In place of lopping off the tops of young thorn plants, a practice which never fails to retard their increaſe in diameter, as well as in height, they ſhould be permitted to ſhoot up without interruption, except where the more luxuriant plants are likely to overtop and injure thoſe that poſſeſs leſs ſtrength and vigour. Theſe overgrown plants ſhould certainly be cut over; and if this be done, and the ſide branches be pruned in a regular ſlope from top to bottom, ſtill allowing the main ſtem, while it does no injury to thoſe adjoining, to remain entire, each plant will increaſe rapidly in ſize and ſtrength, and be enabled to nouriſh ſuch a number of lateral branches,

branches, as will form a fence ſo cloſe and compact, that no animal can poſſibly penetrate it.

When a hedge, from age, or, which more frequently happens, from total neglect, or improper management in rearing, begins to fall into decay, it becomes neceſſary to adopt meaſures in order to bring on a new ſpring or growth. This is done in various ways. That called plaſhing is moſt common. This operation is uſually performed in the early part of ſpring, and in the following manner: After ſelecting ſome of the moſt healthy and pliable ſtems, (one generally in every foot length way of the hedge-row), the others are all cut over near the ſurface. Stakes of dead wood being then driven into the ground, at the diſtance of ſixteen or eighteen inches from each other, the ſtems that were left ſtanding, being dreſſed and pruned all the way from the bottom to near the top, are then nicked, or cut about half way over, within a few inches of the ground, and are interwoven among the ſtakes in a reclining poſture. After the hedge is gone over in this way, the tops of the ſtakes, in order to render the fence more firm and ſecure, are wattled together by a kind of rope made of hazle, or other ſmall twigs.

Sometimes part of the growing ſtems are cut over at the ordinary hedge height, (three or four feet), and left to anſwer the purpoſe of ſtakes; but as innumerable ſhoots ſpring, in the

ſpreading

ſpreading or pollard manner, from the tops of theſe live ſtakes, and which, in time, overhang the ſhoots ariſing from the plaſhers, and from the roots of the ſtems that had been cut to the ground, the deſtruction of the hedge is, in many inſtances, the conſequence of this mode of management. If a hedge be not allowed to be too old, that is, if it be cut down within fifteen or twenty years; and if it be plaſhed in the manner firſt deſcribed, and the plaſhers be carefully removed when the young ſhoots from the old roots or ſtools are ſo far advanced as to be incommoded by them in their growth;—a hedge may be renewed in this manner occaſionally for ages: But if the wood of a hedge be allowed to get to too great a ſize, as often happens, or, if the plaſhers be allowed to remain and impede the ſhoots that ſpring from the ſtools of the former hedge, on which only a ſolid dependence can be placed for a new and vigorous hedge ariſing from the ruins of the old, there is little reaſon to expect that the ſucceeding hedge will be either ſubſtantial or durable.

Conſidering the annual havock committed on hedges, by employing inexperienced people to dreſs, prune and plaſh them, it is ſupriſing that all the conſiderable proprietors do not employ people regularly bred to the buſineſs to manage the hedges on their eſtates. They might, as ſome proprietors in the counties of Leiceſter, Angus, Perth,

Perth, &c. do, covenant with their tenants to pay a profeſſed hedger a yearly ſalary, in proportion to the extent of the different farms. Were this practice general, the fences would be kept in better order, the general expence greatly leſſened, and, in place of ſo many failures as we ſee every where happen, ſucceſs would attend almoſt every attempt to raiſe a ſubſtantial fence of live thorns around our arable and our paſture fields.

Every perſon muſt regret that hedge-row trees, which add ſo greatly to the beauty and ornament of a country, ſhould in general prove ſo deſtructive, not only to the crops within their influence, but alſo to the hedges which they overtop. That hedge-row trees are attended with injurious effects to both cannot be denied; but that ſome are more deſtructive than others, and that by proper management ſome ſorts might be reared, without being attended in any great degree with the bad conſequences ſo generally complained of, are facts well eſtabliſhed in thoſe diſtricts where hedge-row trees are moſt abundant. Both aſh and elm ought to be particularly avoided in forming hedge-rows; as when theſe are planted, in place of growing to a proper height, they uſually become buſhy in the tops; and while their roots ſpread in proportion in the ſoil, their tops form as it were a cover over the hedge, which proves equally injurious at all ſeaſons. Oaks, if not properly trained

trained when young, are liable to the ſame objection; as, wherever a low ſpreading oak is to be ſeen in a hedge-row, the hedge will always be found ſtinted in its growth. It ought therefore to be the object of the planter to train the young oaks, or other trees planted in a hedge-row, to as great a height, and as free of lateral branches, as poſſible; when this is done, the damage ariſing from hedge-row trees will be comparatively inconſiderable to the farmer, and will be greatly overbalanced to the landlord, by the ſhelter which they afford, and the degree to which the value of an eſtate is enhanced, when well ſtocked with thriving hedge-row trees.

Hedge and Wall.—There is a method of what may be called double fencing, very commonly adopted in Scotland, and which, for fields along the ſides of highways and parochial roads, is certainly preferable to every other that has yet been invented; as, while it partakes of the durability, and in reſpect to the ſpace neceſſary for forming it, of the œconomy of a ſtone-wall, it alſo affords the ſhelter uſually derived from a thorn-hedge.

There are different ways of forming this ſort of fence, accordng to the ſituation of the lands. When the field riſes gradually from the road, the moſt common is, to build what is called a ſunk fence of ſtone, the foundation of which is placed in the bottom of the drain on the road ſide; this

fence

fence is built in front of the ſolid earth in the bank, and is raiſed as near the level of the field as circumſtances will admit. The height of the wall is generally from three to four feet, ſometimes more; the thickneſs at the foundation from fourteen to ſixteen inches, according to the propoſed height; and it is contracted as it advances, till at the top it ſeldom exceeds eight or ten. The wall being thus built, and afterwards covered with ſods, forms a complete fence from the outſide. The ſoil at the back of the fence having been properly prepared, either by trenching or ploughing, the thorns are planted at the uſual ſeaſon. The plants are placed diagonally, their tops being made to point outwards, whereby not only more ſhoots ſpring from the ſame ſtem, but the roots being by this means directed inward to the field, they find greater abundance of nouriſhment, and are alſo prevented from forcing againſt, or altering the poſition of the ſtone fence.

There is a method of forming this ſort of fence very commonly practiſed in the county of Fife, which is better adapted for a flat country, or where the fields to be incloſed lie in a ſloping direction from the road, or for a country where free-ſtone cannot be conveniently had. When the thorns are planted, and the mound or bank formed in the manner deſcribed as the moſt common method in which hedges are reared in Scotland, an apparently ſuperficial fence

fence of ſtone, of about thirty inches or three feet in height, (ſuch as will be taken notice of by and by, when treating of ſtone fences, under the denomination of "Galloway Dikes,") is erected on the top of the mound, between the hedge and the field. This may be introduced with much propriety in every country where ſtone is abundant, as a method of ſubdividing, as well as of ſurrounding a farm with fences. If the durability, added to the ſhelter which the young plants receive from the ſtone-wall, be conſidered, the expence of erecting a protection of this ſort, although ſomewhat greater in the firſt inſtance than that of poſt and rail in a diſtrict tolerably well ſupplied with wood, is, notwithſtanding, amply compenſated by the ſuperior advantages that muſt neceſſarily reſult from adopting this method.

There is ſtill another way of uniting a ſtone-wall with a thorn-hedge, in one fence, practiſed in Scotland. It differs from the firſt method only in this, that the thorns are planted horizontally near the middle of the wall, in place of diagonally in the ſurface-ſoil; and holes ſimilar in ſhape, but leſs in ſize, than thoſe common in dove-cots, are left in the wall, a foot or two from the top, to allow the thorns to puſh out. The ſtems ſhooting out at theſe openings naturally bend upwards, and, when they thrive, cover the whole upper part of the wall, giving to the fence

a very uncommon and novel appearance. This ſort of fence is better calculated, however, for ornament than for uſe, and is chiefly adopted with a view of giving an air of neatneſs and taſte about a gentleman's reſidence.

Stone Walls.—Theſe, although by no means the prevailing mode of incloſing adopted in England at large, are yet common in many diſtricts, as in the counties of York, Derby, Warwick, Somerſet, and ſome parts of Wales; and in Scotland, if the highland diſtricts be included, there is probably more land incloſed with ſtone walls, than with any other ſort of fence.

In reſpect to the methods of erecting ſtone fences, a very ſhort deſcription will be ſufficient.

There are three ſorts of ſtone fences: *firſt*, Thoſe made of free-ſtone, ſuch as are common in the better improved parts of both kingdoms: *2dly*, Thoſe formed of the ſtones collected on the tillage lands, or on the moors in Wales, and in the highlands of Scotland; and, *3dly*, Galloway dikes. Theſe laſt, although moſt prevalent in the county whence they derive their name, are nevertheleſs common in ſeveral other counties on the north ſide of the Tweed. The mode of erecting the two former is ſimilar in every reſpect, except in regard to dimenſions, which, in all ſtone fences, vary according to the nature of the materials of which they are conſtructed. A greater quantity of materials, or, in other words,

words, a broader baſe or foundation, is, for inſtance, requiſite to ſupport the fabric, when the ſtones of which it is compoſed are ſo round, or irregular in ſurface, as all land ſtones are, that they connect only very partially, and, when laid together, do not form ſo compact a body as thin flat pieces of free-ſtone may be made to do. The ordinary dimenſions of a fence made of free-ſtone, is from twenty-two to twenty-ſix or twenty-eight inches in breadth at bottom, becoming gradually narrower as it advances in height, (which of ſolid work ſeldom exceeds four feet and a half), till it contract to ſixteen or eighteen inches at the top, on which is placed, edgewiſe, a guard or coping of the broadeſt and flateſt ſtones that can be picked out for the purpoſe.

The fences made of what is frequently called moor-land ſtone are ſeldom leſs than three feet at the bottom, about the ſame height above mentioned, and narrowed at the top to eighteen or twenty inches. Theſe fences are uſually coped with ſod, in the form of an arch, over which is frequently piled a number of ſmall ſtones, with a view of preventing ſheep from getting a firm footing on the top of the fence, and which is found, although a ſimple, a very uſeful precaution; as if any of theſe ſmall ſtones fall down when a ſheep makes an unſucceſsful attempt

tempt to get over, it ſeldom makes a ſecond at the ſame period.

One very great error frequently committed in erecting ſtone fences of this ſort, and which ought always to be avoided, is caſting the foundation too ſhallow; by this means, a violent froſt, ſucceeded by a ſudden thaw, has ſuch an effect, in the firſt place, to contract, and in the ſecond, to expand the pores of the ſoil, that the fabric muſt be conſiderably ſhaken; and whoever has attended to the circumſtance will agree, that greater attention to this particular is requiſite, as they muſt have diſcovered, that more ſtone fences fall in the ſpring of the year than in all the other ſeaſons together. Another error not leſs common, although more inexcuſable, is alſo frequently obſervable, viz. that of placing ſtone fences too near ſtreams and ſmall rills of water, by which means the foundation is often undermined. The impropriety of this conduct is ſo apparent, as to render any comment entirely unneceſſary.

The Galloway dike is of ſingular conſtruction, and in all probability the moſt formidable looking fence that ever was contrived. It is built in the uſual manner to the height of from two feet to thirty inches; a covering of the flatteſt ſtones that can be conveniently procured is then laid over; above which is placed with great art, but ſeemingly in the moſt artleſs manner, what

what may not inaptly be called a net-work of ſtone. This is done by piling rugged ſharp cornered ſtones one above another, to the height of upwards of two feet, in ſuch a manner that each ſucceeding ſtone jams that which was formerly placed, in a manner that gives ſtability to the fabric, while the interſtices are ſo great and numerous, that, to a ſuperficial obſerver, the whole has ſo much the appearance of being in a tottering ſituation, that neither man nor beaſt are diſpoſed to undertake the ſeemingly dangerous attempt of croſſing it.

Much has been ſaid reſpecting the advantages which hedges poſſeſs over ſtone walls, and *vice verſa*. If a fair comparative ſtatement were made, it would be found, that each has a claim to ſuperiority in ſome particulars in which the other is entirely deſtitute. No care or attention can render a thorn hedge, of itſelf, fencible for four or five years; whereas a ſtone wall, provincially, "a dike," is in its greateſt ſtate of perfection when immediately completed; or, in the words of a late Scotch nobleman *, "*it becomes major the firſt year.*" Hedges will not thrive in ſome ſoils, nor in expoſed ſituations, while, by the ordinary method of planting them, they require a great extent of ſurface; whereas ſtone fences may be erected almoſt anywhere, and on very narrow bounds.

Thorn

* The late Lord Elibank.

Thorn hedges are formed of more periſhing materials than the generality of ſtone dikes, and conſequently require more expence and trouble to keep them in complete repair; beſides, when by any accident gaps or openings are made in a hedge, it is difficult, almoſt impoſſible, to repair them again; but as the materials of a ſtone dike always remain, a little labour only is requiſite to put it in the former order. On the other hand, the expence of erecting ſtone fences, even where the materials are within a reaſonable diſtance is much greater. They do not afford that degree of ſhelter which a well managed hedge in full growth is calculated to give; and what is very much againſt them, they yield no return. The loppings of a thorn hedge are uſeful for many purpoſes, and, in a courſe of years, may be ſold for a much greater ſum, in ordinary ſituations, than is ſufficient to defray the whole expence of the original coſt and after-management put together. The expence of a ſtone fence, on the other hand, remains a dead weight on the proprietor and tenant; and no advantages can be expected beyond what may be derived to a greater extent from hedges after the firſt few years. On the whole, however, it is evident from the above ſtatement, as well as what was formerly mentioned, that ſome ſituations are better adapted for one of theſe ſorts of fence than the other. On that account it would

be

be extremely improper, in the writer's opinion, for any perſon who was endeavouring to point out the beſt means by which the agriculture of the country could be improved, to impreſs the reader with an opinion that the one, under every poſſible circumſtance that could occur, was preferable to the other. Thus far ſuch a perſon may ſafely aſſert, viz. that the land muſt indeed be of a very inferior quality, and very unfavourably ſituated in reſpect of climate, if it could not be improved by incloſing with hedges or ſtone walls, or by one or other of the methods to be afterwards deſcribed, to an extent very far ſuperior to any expence which, with prudent management, could be incurred.

Willow Fences.—In low marſhy lands, and along the banks of rivers, where thorns cannot be expected to thrive on account of the ſuperabundance of moiſture, and that they are liable on ſeveral occaſions to be overflowed, and where alſo ſtone cannot be procured, the Dutch willow is frequently uſed as a fence. When proper care is beſtowed, this mode of fencing is, in all ſuch ſituations, greatly preferable to any other, affording, beſides ſhelter and ſecurity, large quantities of wood extremely ſerviceable for many purpoſes of huſbandry; and which, as it can be converted to many uſeful domeſtic purpoſes, is ſaleable at a high price. The Dutch willow, as well as every other ſort of willow, is propagated by cuttings or layers, and requires very

very little attention, either in the planting or after management; and for theſe reaſons, ought to be very generally cultivated in ſituations ſimilar to thoſe above deſcribed.

Earth Fence.—The only other ſorts of fences common in theſe kingdoms, beſides thoſe of a moveable nature, as hurdles, &c. are ſuch as are compoſed chiefly of earth or turf. Theſe are for the moſt part erected in the leſs improved parts of the country, and are conſtructed in various forms. On the higher grounds in Yorkſhire, and in ſeveral parts of the north of Scotland, they are formed of turf cut from the adjoining land, and built up with a conſiderable degree of regularity. The mound, when finiſhed, is from three to four feet at bottom, riſing to about four feet and a half, and narrowing as it riſes, till it contract at the top to about eighteen inches.

This of all others is the moſt ſuperficial, and, on that account, probably the moſt expenſive ſort of fence.—The uncertainty in which the farmers in Yorkſhire are generally kept in regard to poſſeſſion, and the parſimony of the landlords in the north of Scotland, are the only reaſons that can be aſſigned for this mode of fencing being adopted, in diſtricts where ſtone can be procured, or hedges or other kind of live fence can be reared.

In

In the county of Cardigan in South Wales, an improvement on this mode of fencing has been introduced, which merits the attention of thoſe who, from whatever cauſe, are under the neceſſity of adopting a method of fencing inferior both to hedges and ſtone walls The farmers in that country form a bank of ſomewhat larger dimenſions than that juſt mentioned, by placing alternate layers of ſtone and turf; on the top of this bank, when finiſhed, they plant white and black thorn, or ſow furze ſeed. Theſe except in very bleak expoſed ſituations, thrive ſo as to become a ſubſtantial and durable fence, while the additional expence is not worth the naming.

One other particular, in regard to fences, remains to be taken notice of, namely, the conſtruction of the gates. — The form, which is as variable as the ſhape of a coat, merits no attention; whether it is cut out in a fine ginger-bread ornamental form, or put together in a plain home-ſpun faſhion, is of little conſequence. It is of more importance that it be ſo balanced on the hinges that it opens without difficulty, and, after being folded back to a certain extent, that it ſhuts again of its own accord. Without this is the caſe, time is unneceſſarily loſt in opening it, while the riſk of its remaining open, from careleſſneſs or inattention, is great, and the damage incurred from that circumſtance in many inſtances very conſiderable.

The advantages to be derived from incloſing have already been ſtated, and it has alſo been obſerved, that were there not obſtacles, both of a public and private nature, to prevent it, the practice would ſoon become general.

Beſides that of a public nature, (the impoſſibility of incloſing an open-field pariſh in England without a ſpecial act of Parliament, which will be particularly taken notice of on a future occaſion), there are others which, although of a more private naure, operate as powerfully againſt the general introduction of this mode of improvement. One of theſe was formerly mentioned, namely, the diſpoſition of proprietors to add to the extent rather than to the intrinſic value of their former property. Another great bar to the general incloſure of the country, is the ſpeculative idea that too many purchaſers of land in the preſent times ſeem to entertain, whereby they are induced to purchaſe beyond the extent of their capital; than which they cannot be guilty of a more glaring piece of miſconduct, either in regard to their own or the public intereſt. Nothing, in the firſt place, can more effectually lay a foundation for theſe unpleaſant ſenſations that naturally ariſe from an embarraſſed ſituation; while, in the ſecond, people ſo ſituated have it not in their power, by liberal expenditure of money, to improve their own or the national reſources.

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The abominable ſyſtem of entailing property, as eſtabliſhed in Scotland, is another great bar to the improvement of the country by incloſing. Proprietors of ſuch eſtates being, in many caſes, only lifeholders, are not diſpoſed to expend their own money; and they are in general debarred, by the nature of the reſtricting clauſes in theſe deeds, from granting leaſes of ſuch duration as to induce active and enterpriſing tenants to lay out a ſhare of their capitals in incloſing and ſubdividing their farms. While ſuch bars as theſe continue unremoved, there is little reaſon to hope, that this eſſential mean of improving the national territory will ever be univerſally, or even generally adopted.

CHAP-

CHAPTER XXV.

The Importance of Draining, and the different Ways in which Lands are drained.

A SMALL degree of obſervation is ſufficient to ſatisfy every perſon of the bad effects that a redundancy of water has upon vegetation in particular fields, as well as on the health of the inhabitants in extenſive diſtricts. The neceſſity of beſtowing minute attention to the removal of this evil is as demonſtrable as any propoſition can poſſibly be; as land incapable of being drained, will invariably be found incapable of being improved by the uſe of any other means. Every farmer, therefore, who poſſeſſes lands naturally wet and ſpouty, will find it for his intereſt to make draining precede every other mean of improvement.

The draining of land is, in many caſes, one of the moſt intereſting particulars that can fall under the farmer's review, and is frequently a labour ſo difficult as to require the greateſt exertion

tion and attention, even of the moſt active and judicious, to accompliſh. It may therefore, ultimately, prove fortunate for Britiſh huſbandry, that the members of the Board of Agriculture have turned their attention to this object. Reſpecting both the theory and the practice of draining, the nation have a title to look for a full and accurate account from Mr Elkington, through the medium of that Board, by whoſe application to Parliament he received a handſome premium, as an inducement for making a full diſcloſure of all he knew reſpecting both.

The theory of draining is intimately combined with that of the different ſubſoils or under ſtrata. To be able to drain land with certainty requires, beſides long practice, a thorough knowledge of the various ſtrata of which the earth is compoſed, and to what degree each ſtratum, compared with the others, is pervious or impervious to water. Without a competent degree of this ſort of knowledge, Mr Elkington's method of diſcovering ſprings by boring, would much oftener prove unſucceſsful than they do; nor could the miner, but by a knowledge of the different ſtrata, determine, with accuracy, where, by boring, he had the beſt chance of diſcovering coal, or other minerals.

The wetneſs of land may be owing to one or other of ſeveral cauſes, and ſometimes to a combination of two or more together. It frequently happens

happens that land is wet, owing to its ſituation, although naturally dry. When a field lies adjoining to higher grounds, it is apt to be overflowed; and when it has no deſcent by which the water can be drained off, it muſt neceſſarily reſt upon it, till it is either exhaled by the influence of the ſun, or ſinks gradually through the ſubſtrata. This is frequently the caſe adjoining to rivers, and alſo in low ſituations near the bottoms of hills, whence the rains ſometimes deſcend in torrents, and overſpread the adjacent fields.

In other caſes, the wetneſs of land may be accounted for, by the water which had ſunk through the ſtrata of the higher grounds forcing its way up, in great quantities, through a bed of clay, moſs, or other ſtratum, poſſeſſing the power of abſorbing and retaining water; and to which is to be aſcribed the formation of all marſhes, ſwamps, or bogs. That wetneſs in land which is moſt injurious to the farmer, and to the removal of which his attention is moſt frequently called, is that which iſſues from the ſides and bottoms of hills and riſing grounds, in the form of ſprings, and which, for want of a free paſſage perpendicularly, often burſts out horizontally, and ſaturates the adjoining lands to ſuch a degree as to render them, in a great meaſure, unfit either for tillage or paſturage.

Dr Anderſon, who lately claimed the merit of having long ſince laid before the public that ſecret reſpecting draining, for the divulging of which Mr Elkington has been ſo handſomely rewarded, has, in his Eſſays on Agriculture and Rural Affairs, publiſhed in 1776, Vol. I. p. 169, &c. given the following very ingenious account of the origin of land-ſprings *. "Springs are "formed in the bowels of the earth by water "perectating through the upper ſtrata, where "they are of a porous texture, which continues "to deſcend downwards, till it meets with a "ſtratum of clay that intercepts it in its courſe; "where, being collected in conſiderable quan-"tities, it is forced to ſeek a paſſage through "the porous ſtrata of ſand, gravel, or rock, that "may

* The writer has not the moſt diſtant intention of taking up the controverted point, whether Mr Elkington or Dr Anderſon has the merit of being the firſt diſcoverer of this ſo much talked of method of draining. This much, however, he feels himſelf called upon to ſtate in favour of his countryman Dr Anderſon, (but without being prejudiced in conſequence of that circumſtance,) that in the courſe of his various tours through Scotland, he has fallen in with ſeveral reſpectable farmers, who have declared, that by peruſing Dr Anderſon's Treatiſe on Draining, and adopting the methods recommended by him, they were enabled to drain their farms in the way nearly ſimilar to that practiſed by Mr Elkington, and many years before his name was ever heard of in that kingdom.

" may be above the clay, following the courſe " of theſe ſtrata till they approach the ſurface " of the earth, or are interrupted by any ob- " ſtacle which occaſions the water to riſe up- " wards, forming ſprings, bogs, and other phæ- " nomena of this nature, which being variouſly " diverſified in different circumſtances, produce " that variety of appearances, in this reſpect, " that we often meet with." The Doctor adds, in another place, (page 71.) " It is neceſſary " that the farmer ſhould attend to this proceſs " of nature with care, as his ſucceſs in drain- " ing bogs, and every ſpecies of damp and ſpouty " ground, will in a great meaſure depend upon " his thorough knowledge of this; his acute- " neſs in perceiving in every caſe the variations " that may be occaſioned by particular circum- " ſtances, and his ſkill in varying the plan of " his operations according to theſe."

From this remark may be inferred the impoſſibility of laying down any ſpecific rules for under draining, ſo as to ſuit all ſoils and ſituations. The ſize of the drain muſt depend entirely on the quantity of water it is meant to convey, and the number and direction on that of the ſprings, and the ſituation of the ground in regard to outfall or drainage-level. The drains common in Great Britain are known under two general names, *viz.* open and covered drains. The former, which is made uſe of chiefly for intercept-

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ing and carrying off the water that deſcends from the higher grounds, or ſuch floods as overſpread the fields, in conſequence of long-continued falls of rain, differ more from each other in ſize than in form. The covered drains, on the other hand, differ almoſt in every diſtrict, and not leſs in the ſize and form than in the materials of which they are formed.

As the draining of land may with much propriety be called the *ſine qua non* of huſbandry, the writer ſhall endeavour to deſcribe the various methods adopted in theſe kingdoms with all the minuteneſs which, in his opinion, the importance of the ſubject merits. In order to bring it more immediately under the reader's view, the various ſorts of drains are enumerated in the following liſt; and which, after having given a ſhort account of Mr Elkington's method of draining, will be treated of in the order in which they are arranged:

Drains, formed of Bricks;
Free-ſtone;
Land-ſtone;
Wood;
Sod;
Peat;
Straw;

Sinking pits;
Open drains;
Water-furrowing, &c.

Mr Elkington's Method of Draining.—Mr Elkington is a farmer in Warwickſhire; who, having about fifteen or ſixteen years ago rented a farm in that county, in which was a conſiderable extent of wet boggy land, tried an experiment in draining, which proving ſucceſsful in that inſtance, and in many others which he afterwards made on other lands, by degrees, raiſed him into notice as an expert drainer. The method of conducting this experiment was by cutting deep drains, and afterwards uſing an inſtrument ſomewhat ſimilar in conſtruction to an auger with which he bored through the different under ſtrata at the bottom and ſides of theſe drains, with a view of piercing, or, as it is technically called "tapping" the ſprings. Mr Elkington's ſucceſs in draining is well known in many parts of England; and is mentioned in the Report of the County of Warwick in the following words: "The novelty of this practice "(boring) here, and Mr Elkington's myſte- "rious manner, in declaring he knew where "and in what direction the different ſtrata of "the earth divided, and at what particular point "an auger hole might be bored, to lay dry this "or that particular ſpring or well, were matters

"which

" which attracted much notice, and occaſioned " great ſurpriſe; and it is but juſtice to Mr " Elkington to ſay, that in one claſs of bogs, " &c. which abound as much as any other, he " has not only had the honour of introducing " the auger in this county, but the merit of lay- " ing effectually dry many large tracts of land." The beneficial effects of this method of draining are now well known in the counties of Warwick, Worceſter, Glouceſter, Leiceſter, Northampton, Derby, &c.; and although Mr Elkington hitherto remains unrivalled as a drainer, yet there are ſeveral people in theſe diſtricts who, from practice, have acquired conſiderable knowledge in the art, which obviouſly conſiſts in determining, with a degree of preciſion, where the bores are to be made with the greateſt probability of ſucceſs. It is not to be ſuppoſed, that any man can arrive at ſuch perfection as is hinted at in the above extract: Mr Elkington himſelf is often diſappointed; nor ſhould any perſon be ſurpriſed that this ſhould be the caſe. The degree of ſucceſs ſo frequently attending this method of diſcovering a current of water, which is perhaps too weak to force itſelf out at the ſurface as a natural ſpring, but ready to make its eſcape when an artificial opening is made, has in ſo many inſtances proved ſucceſsful, that every farmer, who poſſeſſes

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wet ſpouty land, ought alſo, as is the caſe in all the counties above mentioned, to be poſſeſſed of one of theſe inſtruments. The auger or borer is in every reſpect ſimilar to that uſed by miners for diſcovering coal, marl, &c. The point is ſomewhat of the auger form, from two to three inches in diameter; the rod, which is about an inch ſquare, may be made of any length; but, for the convenience of working, it is commonly formed in pieces of about three feet long. Theſe ſeparate pieces being made to connect with each other by ſcrews, are uſed as occaſion requires. Two men are neceſſary for working it, which is done by fixing a croſs bar of iron on the top of the rod, by way of a handle. The operator having lined off the intended drains in what he conceives the beſt poſſible direction, and theſe having been formed, the operation of boring commences. When ſucceſsful, and the ſpring or ſprings are tapped, the current of water is allowed to run for ſome time before the drains are covered up; in the method of doing which there is nothing particular, as it depends partly on the quantity of water, and the materials that can be moſt eaſily procured.

The writer had once an opportunity of ſeeing the operation of tapping performed in Northamptonſhire; the manner of performing which, and its conſequences, he ſhall endeavour to deſcribe: The ground intended to be drained was rather

rather flat; it was bounded on the one ſide by a river, and on the other by a ſloping bank, whence oozed the water that injured the field. A drain having been made from the river towards the ſloping bank, and another croſs one running parallel, and near to the foot of the bank, the auger was uſed; an attempt or two was firſt made in the drain running from the river to the bank; but, although ſome of the adjoining grounds were very ſwampy, without ſucceſs. Theſe attempts to get at the ſpring having failed, the borers began their operations in the croſs-drain, which in the very firſt inſtance was crowned with ſucceſs exceeding their moſt ſanguine expectations. About three or four feet below the bottom of the drain, and probably at upwards of three feet below the bottom level of the adjoining river, they tapped the ſpring; and having withdrawn the borer, the water boiled up with great violence, riſing to a conſiderable height, and having fallen into the bottom of the drain, ran towards the river. Means ſo effectual for curing the evils ariſing from ſubterraneous water, had no doubt in that inſtance, as they muſt in every other, the effect of rendering the field much more valuable both to the proprietor and tenant, while the expence of boring, by which only in this caſe the evil could have been effectually eradicated, is not worth mentioning.

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When it is intended to form drains with brick or ſtone, unleſs where an extraordinary depth is requiſite, they are uſually made about three feet deep, from twenty-four to thirty inches wide at top, and from nine to eighteen inches at bottom. When it is propoſed to uſe wood, ſod, &c. the dimenſions are much leſs, as will be afterwards more particularly explained.

Drains formed of Bricks.—In ſeveral counties of England, where ſtone is difficult to be procured, bricks are frequently uſed for making drains. Sometimes bricks of the uſual form are uſed, two or three being laid at each ſide, one above the other, and others lengthwiſe acroſs. In ſome places bricks of a particular form are moulded for the purpoſe. When for ſmall drains, they are formed in the ſhape of an arch, and placed one by the ſide of the other in the bottom of the drain. When the drains are meant to convey a conſiderable current of water, the bricks are made broad at the baſe, and taper up on one ſide, (that which is placed next the ſides of the drain), till about half the breadth of the baſe. This laſt mentioned ſort is placed in regular lines on each ſide of the bottom of the drain, and are covered over with broad flat pieces of free-ſtone, and afterwards, as in every other caſe, the remainder of the drain or ditch is filled up with the earth which had been formerly dug out. Drains made of bricks have their advantages

vantages and diſadvantages. They anſwer beſt in ſoils naturally dry, ſuch as lie on an under ſtratum of gravel, and where the chief deſign of drains is to carry off water ariſing from ſprings in particular parts of the field. Rain-water falling on ſuch ſoils ſinks very rapidly, and in few caſes obſtructs or injures vegetation; but, in theſe ſoils where rain-water ſinks more gradually, and where of courſe drains are neceſſary, for the double purpoſe of carrying off water ariſing from ſprings, and that which lodges in the ſoil and oozes out at the ſides of the drains, the bricks in theſe drains, being cloſely placed together, do not give ſuch a free paſſage to the filterings from the ſides of the drain as thoſe formed of ſtone, in the ordinary way, are calculated to do.

Drains formed of Stone.—Theſe vary conſiderably, ſometimes owing to the difference in the materials of which they are formed, and frequently to the practice of particular diſtricts, in regard to the manner of placing the ſame ſort of materials.

In filling up drains, where ſmall ſtones collected from the adjoining lands are uſed as means of preſerving a paſſage to the water, there is no variation in the practice of any particular diſtrict from that of others, nor is much attention anywhere beſtowed in regard to the manner of placing theſe materials. They are uſually thrown in

in promiſcuouſly, to the depth of about eighteen inches; and being covered with ſtraw, fern, or ruſhes, the remainder of the drain is filled up with earth. In ſome places, a method which appears extremely well calculated for preventing the interſtices between the ſtones from being choaked up with ſand or gravel is adopted, that is, placing a layer of long broom, ruſhes, &c. in the bottom of the drains before the ſtones are thrown in. This, in all drains which have conſiderable declivity muſt be attended with good conſequences, eſpecially if there is a current of water, as it is apt to break up the bottom of the drain, and to carry the ſand or gravel along with it, till being obſtructed in the paſſage, they lodge, and by degrees ſtop up the courſe. If drains of this deſcription are filled to a proper depth with ſmall ſtones (about the ſize of a man's fiſt), and a layer of ſtraw, ruſhes, &c. ſpread both below and above them, ſo as to prevent the intermixture of earth, they muſt not only be durable, but the water in its paſſage leſs liable to interruption than in any other that are formed of ſtone.

Another method of conſtructing drains of ſtones collected from the land, is to ſelect the largeſt and broadeſt of them, and to place them triangularwiſe in the bottom, leaving a ſmall vacuity in the middle for the water to run. When the ſtones beſt ſuited for the purpoſe are placed in the

the manner now mentioned, ſmall ſtones are laid over them to the uſual depth, and over them again, ſtraw, earth, &c. As this ſort of drain is calculated to give a more free vent to the water, it may be conſidered as an improvement on the other method, wherever any regular and conſtant ſtream is expected.

There are two methods of forming drains with free-ſtone, which, as they are materially different from each other, require to be ſeparately deſcribed. The firſt is to build two narrow walls, one on each ſide in the bottom of the drain, (which in ſuch caſes is made conſiderably wider than when land-ſtones only are uſed), and to connect theſe walls by a cover of ſtone on the top. The ſize of the open part of the drain, when thus finiſhed, is about eight or ten inches in height, and ſix or eight in breadth. When ſmall land-ſtones can be procured, they are laid above the cover of the free-ſtone to the depth of ten or fifteen inches, and a layer of ſtraw, ruſh, &c. or of turf with the green ſide downwards, being placed over the whole, the earth is then replaced.

The other drains conſtructed with free-ſtone, ſeem extremely well adapted for the purpoſe of drainage, when the filterings from the ſubſoil, as well as the runnings from the ſpring, require free paſſage. Two flat ſtones are placed edgewiſe, one edge of each coming into contact with

the other at the bottom, and the others reſting on the ſides of the drain; on the top of theſe are laid horizontally other flat ſtones by way of cover. This ſort of drain, when properly made, has a reſemblance to the letter A reverſed, and not only affords two courſes for the water from the main ſpring, but alſo gives free admiſſion to that which oozes out at the ſides from the ſubſoil. A drain ſo formed, will bear any preſſure that it can be ſubjected to; and for the double purpoſe above mentioned, ſeems as well calculated as any other that can be formed.

The practice of forming drains of bruſhwood, ſod, ſtraw, &c. is by no means generally adopted; but as ſome places are but very indifferently ſupplied with the beſt materials (ſtone) for draining, the practices of ſuch diſtricts as muſt have recourſe to other means for getting free of ſuperfluous water, probably to a greater degree, merit particular notice.

Drains formed of Wood.—Drains of this ſort are very common in Suffolk, Eſſex, Hampſhire, and many other diſtricts in England, and are conſtructed in the following manner: A drain from twelve to fifteen inches wide, is in the firſt place formed to the depth of ten or twelve inches; and when the looſe earth at the bottom is taken out with the common ſpade, the labourer uſing one not exceeding three or four inches wide, tapering nearly to a point, makes a narrow

row cut to the depth of ſix or eight inches more; and the looſe ſoil at the bottom being taken out with a kind of ſcoop, bent and formed for the purpoſe, the labour of forming the drain is completed. Then willow, thorn, or any kind of bruſhwood, as the boughs of trees, &c. is cut into lengths of twelve or fifteen inches, and laid to the depth of ſeveral inches, according to their ſtrength, acroſs the top of the ſmall drain, and made to reſt on the ſides or ſhoulders which conſtituted the bottom of the larger drain before the narrow cut was made. By this means a clear paſſage, ſix or eight inches in depth, and from two to four inches wide, is left for the water. The bruſhwood being properly placed, and to a regular thickneſs, is covered with a layer of ſtraw, to prevent the earth, when replaced, from falling into the gutter below. This may appear to ſome as a very ſuperficial mode of draining; when compared with drains made of ſtone, it no doubt is ſo; but it is ſurpriſing how durable, and, in many inſtances, how effectual they are. The writer was informed, in the county of Eſſex, that inſtances are there very common, where drains of this ſort have been known to laſt upwards of thirty years. Much of their durability is underſtood to depend on uſing green new cut wood, in place of that which had been allowed to remain ſo long expoſed to the influence of the weather after being cut,

cut, that the natural ſap was dried up. As this is a cheap, and, when well executed, an effectual mode of draining, and durable beyond the period which farmers in general acquire of what may be called a permanent intereſt in the ſucceſs of drains on any farm, it may be for the intereſt of thoſe who poſſeſs ſhort leaſes, and where ſtone is not to be had without an extravagant expence of carriage, to uſe wood, as being for that purpoſe next in durability to ſtone or brick.

Drains made of Sods.—Where the ſoil is of a very tenacious nature, and old ſward-turf can be procured, it is not uncommon, in ſome diſtricts, where neither ſtone, brick, nor wood, can be eaſily obtained, to uſe ſod or turf in the conſtruction of drains.

This is the caſe in ſome parts of Yorkſhire and Wales, and in the counties of Nottingham, Buckingham, Eſſex, &c. The drains having been formed in the manner deſcribed when bruſh-wood is uſed, the ſods are laid on the top of the narrow part of the drain, with the green ſide downwards, and being rammed down as hard as poſſible, form a kind of reverſed arch over the open part of the drain. This is found from pretty general experience, in the diſtricts above mentioned, to be a very cheap, and, conſidering the materials, a ſurpriſingly durable method of draining; anſwering, in paſture-fields eſpecially, all the purpoſes that the farmer can expect

to

to derive from drains conſtructed with more labour, and at a much greater expence. They are ſaid to laſt frequently twenty years and upwards; but the period which it can be ſuppoſed they will continue to prove effectual, muſt depend on the nature of the ſoil, and the current of water.

Drains formed of Peat.—Peats are materials for forming drains, which few people would have thought of. Drains formed of peats, are, it is believed, peculiar to Lancaſhire, and introduced there only within this ſhort period.

The following account of this mode of draining is extracted from the Agricultural Report of that county: "A piece of peat, the uſual ſhape "and dimenſions of the common turf, has been "made uſe of. After piercing the turf with a "kind of punch, when wet, by which a hole "is left of about three inches ſquare, a little "arched at the top, and which are placed, af-"ter being hardened in the air, ſide by ſide;" and for which the writer adds: "The Agricul-"tural Society at Manchester rewarded the in-"ventor with a premium." From the preceding very imperfect deſcription, it is impoſſible for any perſon to determine whether the peats are laid edgeways in the bottom of the drain, and that the hole that had been punched out is meant to anſwer for a pipe through which the water is to run, or whether they are laid the broad

broad way, ſo that the cavity of the arch anſwers that purpoſe. But in either caſe it may be inferred, that the country about Manchester muſt be very deſtitute of materials for forming drains, when the Society, inſtituted for the purpoſe of promoting Agriculture, deems it proper to give a premium for ſuch an invention. There is no queſtion but ſome peats, which, when thoroughly dry, are of a very hard nature, might, when laid in the bottom of a drain, and properly covered up, continue to retain their hard firm nature in ſome degree like bricks, and might, on that account, be rendered uſeful in draining lands; but that peats of the common ſize (rather leſs than bricks, ſhould, by laying one row of them in the bottom of a trench, prove materially beneficial in draining the adjacent lands, appears to the higheſt degree improbable. It is, however, the Lancaſhire method of uſing peats in forming drains, rather than reſpecting the propriety of uſing them, that the writer entertains any doubt. He has on very many occaſions ſeen peats, which, when dry, were of ſo hard and durable a nature, that he has no doubt but they would laſt, when covered up, for ages. Therefore, new as the idea of uſing peats in place of brick or ſtone in the bottom of drains may be, this method may nevertheleſs be worthy the attention of thoſe who have not acceſs to brick or ſtone,

ſtone, but who have it in their power to procure a liberal ſupply of peat.

Drains formed of Straw.—There is probably no other county in Great Britain where ſtraw is the only article uſed in forming drains, with a view of preſerving a free paſſage to the water iſſuing from ſprings, or filtering through the ſubſoil into the open part of the drain, beſides Middleſex. The trench is made of the ſame dimenſions as deſcribed when treating of drains formed of wood and ſod; and when completed, ropes of ſtraw, twiſted by a machine, ſuch as is uſed for twiſting hay that is exported, and in ropes about the ſize of a man's leg, is laid on the top of the narrow part of the drain; and being thruſt down as hard as poſſible, and the looſe earth that falls into the bottom, in the courſe of the operation, being carefully ſcooped out by the labourers as they go along, the ſtraw is then covered up with earth in the uſual manner.

From the preceding account of the covered drains uſed in theſe kingdoms, it will occur to the obſervant reader, that thoſe made of ſtone or brick are beſt adapted to carry off water iſſuing from ſprings, and that the others can only be uſed with propriety where the object is to drain off the water that oozes through the ſoil, and which, if not carried away by under drains, would chill the ſubſoil, and greatly injure vegetation. But as many farmers are ſo ſituated, that materials of

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ſome ſorts only can be commanded in abundance, while others cannot be had on any terms, the writer judged it proper to give a ſhort deſcription of all the different ſorts of materials which has come to his knowledge, as being uſed in any part of the iſland; and that farmer muſt be indeed ill ſituated, who has it not in his power to command ſome one ſort, or rather to make an election of one ſort in preference to two or three others, though there are perhaps very few that can command all the various ſorts in abundance. One thing is very certain, that in many parts of Scotland, the buſineſs of draining land is rendered much more expenſive than there is any occaſion for; as if theſe narrow drains covered with bruſhwood, ſod, ſtraw, &c. anſwer the purpoſe in ſtrong adheſive ſoils in England, as they certainly do, it would be difficult to give a ſubſtantial reaſon why in ſimilar ſoils they ſhould not be equally efficacious in Scotland.

Sinking Pits.—Some fields are ſo extremely ill ſituated, in regard to outfall, or deſcent for drainage, that it is not poſſible to free them from water, either by open or covered drains, ſo as to render them at all times fit for tillage or paſturage. If, in a field ſo ſituated, the farmer can diſcover a ſub-ſtratum of ſand or gravel in any part of it, to which, by opening a drain, he can conduct the ſtagnated water, and if he will there dig a large pit, the evil will be removed, as the water

water will ſink rapidly through the ſtratum of ſand or gravel. Should this anſwer the purpoſe, of which, in moſt caſes, there is little reaſon to doubt, he has only to fill up both the pit and the drain with ſtones collected from the land; and the improvement will not only be effectual, but permanent. This method of drainage, it muſt be allowed, is liable to one objection, namely, the riſk that, by opening a communication to the ſtratum of gravel through the impervious ſuperſtratum, the evil, in ſome caſes, may, in place of being removed, be increaſed, by an additional eruption of water. To obviate this difficulty, it is an eaſy matter to make a trial with the borer before the pit is dug: If there be an appearance of a ſpring riſing, the bore may be eaſily cloſed, and a trial made in another place.

Open Drains.—In low wet ſituations open drains are frequently formed, for the double purpoſe of carrying off the ſuperfluous water, and of fencing the fields. In all ſuch caſes, the ſize of the drain muſt depend on the ſituation of the farm. If the drains of a particular farm be unconnected with thoſe of others, there is little difficulty in regulating their ſize according to the probable quantity of water to be drained off in conſequence of floods; but if the drains connect with thoſe of other farms ſituated at a greater diſtance from the outfall, they ought to

be made of much larger dimenſions than is neceſſary for the drainage of that particular farm only, otherwiſe the adjoining lands will be in danger of being overflowed after every extraordinary fall of rain.

The lines or directions of the drains muſt alſo depend on particular circumſtances. Where an opportunity is afforded to line them off in that way which, in a flat country, is beſt calculated to anſwer the purpoſe of drainage, ſome longitudinal drains ought always to be made, as being beſt for conducting off the water; but croſs drains are equally uſeful for intercepting and gathering it. All fields where open drains are neceſſary, ought therefore to be rather broad than long; as although the furrows on a field nearly level are very good conductors of water for a ſhort ſpace, yet they do not anſwer for conveying it to any conſiderable diſtance.

There is one general rule in regard to the dimenſions of open drains that ought always to be attended to, namely, to make them ſlope one foot for every foot of depth. A great ſlope is not ſo neceſſary in ſtrong clay ſoils as in thoſe where there is ſand or gravel in the bottom; but in the generality of ſoils, an adherence to the above rule will be found beſt calculated to anſwer every uſeful purpoſe; and ſuch drains have alſo a better chance of ſtanding than thoſe of any other form that is likely to prove uſeful.

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If open drains are to be formed in ſtrong and adheſive ſoils, where there is an under ſtratum of ſand or gravel, it will always be found attended with the moſt beneficial effects, and far ſurpaſſing the additional expence that may be thereby incurred, to cut through to theſe; by that means a complete power of drainage will be obtained; as if any covered drains are afterwards found neceſſary in particular parts of the field, theſe may be opened with a perfect certainty in regard to their utility.—Some few proprietors in both kingdoms, although the number is not large, ſhew a very laudable attention to the draining of their eſtates, in ſo far at leaſt as to covenant with their tenants, that they ſhall clean out all the open drains on their reſpective farms once every year, and by a certain day; and failing of which, the proprietors reſerve a power of doing it at the tenant's expence. As this is a meaſure calculated evidently for the intereſt of both parties, it ſhould be made a general rule on every farm where open drains are found neceſſary.

The drainage in the counties of Cambridge, Lincoln, Huntingdon, Northampton and York, where that mean of improvement is more eſſentially neceſſary, owing to the low ſituation of a great proportion of the beſt lands, is more neglected, or rather miſmanaged, than in any other part of the iſland. Were it to become a queſtion,

ſtion, whether the agriculture of theſe valuable counties has not been injured to a greater extent than all the profits ariſing from the inland commerce would counterbalance? it is believed it would be determined in the affirmative. At leaſt, whoever has travelled over the low parts of theſe diſtricts, cannot but have obſerved, that the numerous inland navigations, ſo common in that part of the country, operate as a great, and as they are at preſent conducted, (the proprietors of the navigations and the proprietors of the ſoil having ſeparate and oppoſite intereſts), as an unſurmountable bar to the complete drainage of theſe otherwiſe valuable lands.

Water Furrowing,—Is the neceſſary operation of clearing out that part of the mould which had fallen into the furrows when the ſeed was harrowed in. This is very effectually done with the common plough, which is not only drawn along the furrows, but alſo in ſuch other directions through the field, as the ploughman's eye can direct as being beſt calculated to anſwer the purpoſe of drainage. There are few minute particulars in the management of a farm that more clearly denotes general attention or neglect, in the conduct of the farmer, than this now under review. If a traveller obſerve a farm well water-furrowed, and the head lands cut through, ſo that the water may have free paſſage in caſe of any ſudden flood, he may be ſatisfied, without

out further inquiry, that the farmer is attentive, and that if he fail in reaping good crops the fault is not owing to his general management. If, on the other hand, water be ſeen lodging in every furrow, and no pains or labour beſtowed to remove it, the farmer may be ſet down as a ſloven, and as one who is careleſs of the conſequences that may be expected to reſult from miſmanagement; and yet it is aſtoniſhing in how few diſtricts it is conſidered as a neceſſary part of the farmer's buſineſs to water-furrow his fields after they are ſown and harrowed. How little in general do farmers ſeem to conſider, that ſaving a little money or labour in the performance of ſo neceſſary a work is the worſt ſort of œconomy! The neglect of this branch of the due cultivation of the ſoil often hazards a crop, even in ſeaſons not uncommonly wet, and muſt therefore be conſidered not only an improper ſaving, but one which, in nineteen inſtances out of twenty, is attended with very bad conſequences.

Could it be ſuppoſed, that every Britiſh farmer, entitled to aſſume the name, were not fully acquainted with the advantages that reſult from draining, it might be proper to enter into a particular enumeration of them; but this would anſwer little purpoſe. Water is eſſentially neceſſary to vegetation, and is, by philoſophers, reckoned a chief ingredient in the food of plants.

plants. It is at the ſame time well known, that a ſuperabundance of water is a great impediment to vegetation, and that it is the mean frequently of injuring, and ſometimes of deſtroying, the moſt valuable of all plants, the corns and graſſes. The climate of Great Britain is naturally moiſt, and a ſuperabundance of water in the ſoil is of courſe the conſequence. To remove this bar to the production of good crops, becomes therefore equally the duty and the intereſt of every farmer. The advantages reſulting from a due attention to this important branch of huſbandry are obvious. Paſture fields, in place of producing only coarſe ſour herbage, intermixed with aquatic plants, which no animal will eat, may be made to yield freſh, ſweet vigorous graſſes; while tillage-lands may be rendered ſo much more productive, as that the firſt crop will fully repay the expence of thus laying a ſolid foundation for permanent and ſubſtantial improvement.

CHAP.

CHAPTER XXVI.

The beſt and leaſt expenſive Methods of forming Embankments.

THE embankment of extenſive tracts of fen country, as thoſe in Lincolnſhire, Yorkſhire, and many others in various parts of England, falls more properly under the direction of engineers than of farmers; we ſhall therefore, for the preſent, leave ſuch undertakings to be managed, or, as is too often the caſe, miſmanaged, by that deſcription of people, and proceed to point out ſuch means as, if uſed in proper time, are moſt likely to guard thoſe who poſſeſs farms bounded by rivers, from the loſſes they may otherwiſe ſuſtain in conſequence of their ſituation beſide ſo dangerous neighbours.

Farms ſituated along the banks of rivers are very liable, owing to that circumſtance, to be injured in various ways; and it will naturally occur to every attentive farmer, that danger is to be apprehended,

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1*ſt*, From part of the ſoil being carried away in times of flood.

2*dly*, From rivers overflowing their banks.

3*dly*, From rivers in times of flood flowing back into the channels of the rivulets and ſtreams that conduct the water from the more elevated and diſtant grounds to the rivers, whereby theſe rivulets and ſtreams are made alſo to overflow their banks.

1*ſt*, The danger of the ſoil being carried away in times of flood, is increaſed or decreaſed according to circumſtances; as, the form of the banks, the nature of the ſoil, the rapidity of the river, and the quantity of water that lodges on the margins of the banks, or falls over them into the river.

When the banks of a river are perpendicular, eſpecially if the ſoil be of a rich mouldering nature, the danger of part of them being carried away by floods is much greater than when they ſlope gently from the ſurface of the field to the bed of the river. When that is not the caſe naturally, they ought to be moulded into that form by art; as when a river, in place of being confined in its progreſs, has a power of eflux and reflux, the damage to be apprehended is inconſiderable, compared with what is likely to happen,

pen, when, being reſtrained within too narrow limits, it is conſtantly ſtruggling for an extenſion of ſpace. When the ſoil is a rich free mould, and the under ſtratum, oppoſite to the greateſt force of the water, ſand or gravel, this ſtruggle never fails to be attended with bad conſequences.

If the ſoil and ſubſoil be one entire maſs of clay, or ſtrong loam, and the current of the river do not preſs more upon one part than another, a moſt ſubſtantial improvement may be effected by ſloping the bank, ſo that the declivity may be one foot in three or four, from the ſurface of the field to the bed of the river. This ſome may object to, as ſacrificing a certain portion of valuable land; but it ſhould rather be conſidered as a premium paid for the inſurance of the remainder, than as a total loſs. If gravel mixed with ſmall ſtones, can be conveniently procured, ſpreading theſe materials on the ſloping bank, to the depth of eight or ten inches, and till beyond the flowings of the river, will prove a good ſecurity againſt further damage; and if the bank be planted thick with any ſort of willow, eſpecially the Dutch willow, it will, in a ſhort time, become an impenetrable fence, while the annual cuttings of wood will ſoon be equal to the heritable value of the land thus apparently ſacrificed. Where no gravel can be procured, the new ſloped bank ſhould be immediately covered with well ſwarded turf, which ſhould be

preſſed down as hard as poſſible, either with the back of a ſpade, or with wooden mallets. If this be done in the beginning of ſummer, and willows be planted the following autumn, the improvement will be both effectual and permanent. In caſe the river run with extraordinary violence againſt any one particular part of the bank, it may be neceſſary to make a fence or bulwark of ſtone in the front of that place; the beſt way of doing which is, in place of building a wall, to drop the ſtones in a careleſs manner, but ſo as they may lie cloſe together on the ſloped bank. This is a much more ſecure mode of fencing, if the bank be made with ſufficient declivity, than any ſtone wall that ever was built for the purpoſe; and while it is the moſt ſecure, it is alſo the leaſt expenſive; but care ſhould be taken to lay the ſtones all the way from the bed of the river, till conſiderably beyond where the river flows in common.

Where the ſoil is of a ſtrong adheſive nature, and the under ſtratum is ſand or a pebbly gravel, it becomes in a much greater degree neceſſary to ſlope the banks. The water, when ruſhing violently along, has a powerful effect in undermining the bank, and carrying off theſe incoherent ſubſtances; ſo that the ſoil, having nothing to ſupport it, naturally gives way, and frequently in ſuch quantities as to occaſion very ſerious loſſes both to proprietors and tenants. In all

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ſuch caſes, the ſlope ſhould be made much more gradual than when the ſoil and ſubſoil is of the ſame quality, and ſuch as will nouriſh aquatic plants. The banks having been ſloped according as circumſtances require, a thick coat of gravel, mixed with ſmall ſtones, where ſuch can be procured, ſhould be laid on, ſo as to form a kind of natural beach, over which the river, when in flood, may have power to extend itſelf at pleaſure. Should it be difficult or impoſſible to procure ſuch materials as are proper for forming this beſt of all defences, ſtrong thick ſods ſhould be placed on the ſurface, in the manner before directed, which, if laid on in ſpring, or early in ſummer, will have time to unite, and to become one compact body before the autumnal floods (which are thoſe whence the greateſt danger is to be expected) begin to flow. If the ſubſoil be of ſuch a nature as that willows will not grow, ſuch ſods as are full of the roots of ruſhes ſhould be made choice of in preference to all others; as when theſe plants thrive and ſpread over the ſurface, it becomes in a great degree impenetrable by water, even in great floods, and when the river runs with conſiderable violence and rapidity.

The directions above given will be found more or leſs practicable and uſeful, according as the river on ordinary occaſions runs with greater or leſs rapidity. In level, or nearly level diſtricts, all that is neceſſary, is to ſecure full ſcope for

for the rivers to overflow their uſual bounds without interruption; when that is ſecured by either of the methods before mentioned, floods, unleſs very violent, ſeldom do any material damage to the banks of rivers in ſuch ſituations. It becomes, in many caſes, extremely difficult to fence rapid running rivers, in ſuch a manner as to prevent part of the banks from being carried away by inundations. Sloping the banks would be attended with no good conſequences. Even ſtrong bulwarks made of ſtone, are often ſwept away by the overpowering flood. The writer has ſeen a method of fencing the ſides of rapid running rivers adopted with ſucceſs, after ſeveral other attempts had failed. It was by means of large baſkets, provincially, "creels," formed of hazle, willow, &c. into a kind of open network; which, being placed along the bottoms of the banks, were filled with ſtones. This is a very ſimple, and by no means an expenſive expedient; and as theſe baſkets may be made to contain two or three tons of ſtone, it can only be on few occaſions, and in very particular ſituations, that a baſket containing ſuch a weight can be diſplaced or carried away. Such a mode of fencing as that now mentioned, the writer is perfectly ſatisfied, would prove effectual in many parts of Scotland and Wales, where the rivers run with uncommon rapidity.

Owing

Owing to inattention, or rather to not being aware of the conſequences, much damage is often done to the banks of rivers in level diſtricts, eſpecially if the banks be perpendicular, and of a conſiderable height, by allowing the land-floods to fall over them into the river. As the water from the furrows approaches the bank, it is frequently ſtopped in the furrow of the head ridge, which becomes for a time a kind of reſervoir; the conſequence of which is, that a conſiderable proportion of the water ſinks and filters through the earth, which being thus ſoftened and ſwelled, is more eaſily undermined and carried off by the river. Sometimes little cuts or openings are made from the furrows acroſs the head-ridge, for the purpoſe of conducting the rain-water into the river; here again the conſequences are equally bad. Whoever will examine the bank of a river where this mode of management is adopted, and it is very common, will obſerve, that at every one of theſe cuts or openings a little creek is formed, in conſequence of the bank having been more ſoftened, and by that means having become a more eaſy prey to the river when in flood. To prevent theſe evils, it is neceſſary, beſides ſloping the banks, to devote a part of the lands adjoining, to the breadth of twenty or thirty yards, for inſtance, either to paſturage, or the growth of trees; and to form a drain at a proper diſtance from, and parallel to, the

the bank, for the purpoſe of collecting and carrying off the water from the furrows. Were this done, and were the water from this drain conducted into the river by conduits, formed a little above its ordinary level, much land, which is annually loſt by neglecting this ſimple precaution, would be ſaved.

2*dly*, Injuries, although of another nature, are often ſuſtained by farmers from rivers overflowing their banks. Sometimes the farmer is prevented from ſowing his fields; at other times, the crops of grain and graſs are greatly injured, by being covered for a conſiderable time with water; and at others again, the whole produce of the year, the hay and corn-crops, are ſwept away. To prevent evils ſo complicated, and ſo ſerious in their natures, is certainly the buſineſs of every man, who, from the ſituation of his farm, has reaſon to apprehend, that, without uſing proper precautions, he may be ſubjected to ſuch viſitations. Theſe damages can only happen in level tracts, where the banks of the rivers are low, and where the courſe is not of ſufficient breadth to contain the water in time of flood. Some people, although very improperly, raiſe mounds of earth cloſe to the top of the bank, and of a height exceeding that to which the river can be expected at any time to riſe. Theſe mounds, from being placed ſo near the river, are unable to reſiſt the preſſure of the water;

ter; and, by giving way, frequently admit a current into the fields, which proves much more injurious in its courſe than if no mound whatever had been erected. Were a mound of earth formed on the ſide of the drain propoſed to be made for carrying off the land-water, and were that mound well ſloped on the ſide toward the river, it would be the moſt ſecure and effectual guard againſt rivers doing injury to the adjoining lands of any that could be adopted.

By theſe mounds being placed at a diſtance from the river, the force of the ſtream would be much leſſened, and the natural boundaries of the river greatly enlarged; as, in proportion as the mounds are removed from the centre of the current of the river, in like proportion will they become more ſecure, as being leſs liable to violent preſſure. The propriety of erecting theſe mounds at a proper diſtance muſt therefore be ſufficiently evident; as when mounds are erected near the top of the bank, which can only be owing to ill-judged parſimony, they form, as it were, a part of the bank, and are liable to be undermined and ſwept away. Whereas, when they are placed at the diſtance of twenty, thirty, or forty yards, they ſerve rather as a boundary to confine the overflowing water, which glides along the bottom, than as a barrier to prevent the encroachments of an impetuous river.

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3*dly*, Farmers, who poſſeſs lands in low ſituations, often ſuſtain damage from rivers, in times of flood, by their flowing back into the channels of the rivulets and ſtreams that conduct the water from the more diſtant and elevated grounds to the rivers, whereby theſe rivulets and ſtreams are made alſo to overflow their banks. The only precaution that can be adopted in ſuch a caſe, or at leaſt the one which appears to have the greateſt probability of anſwering the purpoſe, is to erect mounds at a diſtance from the banks, and of a ſize proportioned to the quantity of water which, from the cauſe now mentioned, may be ſuppoſed at any time to ſtagnate in theſe channels. This may be done at a very trifling expence, either in money or land. If the proprietors do not chuſe to ornament the country, and improve their own eſtates, by planting trees on the borders of theſe rivulets and ſtreams, the farmers may ſo conſtruct theſe mounds as that they may become fences to their arable fields, while that portion of the farm, neceſſarily and properly cut off for the protection of the remainder, may be devoted to paſturage.

Whether the right or title which a proprietor ought to poſſeſs in regard to altering, widening, or deepening the courſe of a river, be fully eſtabliſhed, or to what extent, the writer does not know. But one thing is certain, viz. that many expenſive and vexatious litigations, between thoſe who

who poſſeſs lands on the oppoſite ſides of rivers, often take place, in conſequence of one of the proprietors endeavouring to effect the improvement of his eſtate by one or other of the means above mentioned; which might be prevented, were proper regulations eſtabliſhed, and made generally known. This is one, although not the only cauſe, why rivers are permitted to do ſo much damage to lands adjoining to their courſes. Inattention or neglect on the part of proprietors is alſo another cauſe why this evil is, from year to year, allowed, without any attempt being made to check it. There are many inſtances, eſpecially in the Highlands of Scotland, where gentlemen, who are proprietors of both ſides of the river, allow extenſive meadows to be overflowed after every fall of rain, ſo as to be in a great meaſure rendered uſeleſs; whereas, were a little attention and money beſtowed in deepening the bed of the river in particular places, which could often be done at a very trifling expence, theſe meadows might be rendered valuable for tillage, but particularly ſo for paſturage.

There is nothing that operates more powerfully againſt the general drainage of any particular diſtrict of country, than the manner in which corn-mills are frequently placed. An improper choice of the ſituation of a mill, although probably favourable for the proprietor, is ruinous

to the poſſeſſors of the low-lying land adjoining. For, according to a remark made by the writer, in his Report of Northamptonſhire, although not particular to that county, theſe mills are generally placed in the worſt poſſible ſituations; as, in place of being erected on the ſides of the meadows, and ſupplied by leads or cuts from the main body of the water, they are built on low ground, and every miller has the command of the whole river, by which means an obſtinate man has it in his power, in time of flood, to injure his neighbours with impunity, and that too without in any material degree benefiting himſelf.

CHAP.

CHAPTER XXVII.

Paring and Burning, &c.

THE practice of paring and burning, or burn-breaking, or, as it is in ſome places called, "Devonſhiring," ſeems to have been well known to the ancients, as may be inferred from the two following lines of Pope's Tranſlation of Virgil's Georgics:

> Long practice has a ſure improvement found,
> With kindled fires to burn the barren ground.

In the firſt ages of agriculture, when woods were to be cut down, ſhrubs to be grubbed up, and large ſtones and other incumbrances to be removed, the plough, if it was then introduced, could only have been made to act with effect after the ground was cleared of theſe impediments to cultivation. Where, in order to prepare land for the reception of the ſeeds of plants uſeful

uſeful for man, it became neceſſary to fell the trees, and to grub up the under wood, ſhrubs, and rank weeds of every kind, ſuch operations could have been performed only by manual labour; and as paring and burning was the chief mean that could have been adopted, for reclaiming lands in ſuch a ſtate, it is not ſurpriſing that that method of improvement ſhould in ſuch circumſtances have been introduced. As this method of preparing the ſoil for the production of uſeful crops is ſtill known by the name of Devonſhiring, it gives reaſon to found a conjecture, that the county of Devon was that part of the iſland where the firſt emigrants from the Continent ſettled, and that paring and burning was then, and owing to that circumſtance, introduced at an earlier period into that part of Britain than any where elſe.

Paring and burning is a mode of management, (whether of improvement, except in certain caſes, remains, in the writer's opinion, to be proved), pretty commonly adopted in nearly one half of the counties of England and Wales. It was alſo a practice very common in the Highland parts of Scotland; but of late years, the proprietors of theſe diſtricts have, as if by general agreement, ſet their faces againſt it; and the inſtances may be ſaid to be very rare, where, in that kingdom, the uſe of this mean of rendering lands

lands leſs difficult of cultivation is now permitted.

In performing the operation of paring, or of ſeparating the ſward from the ſoil, ſeveral inſtruments are uſed in one part or other of theſe kingdoms. That which is the moſt ancient, is a kind of curved mattock or adz, about eight or ten inches long, and five or ſix broad; and which, by its form, appears better adapted for cutting up the roots of bruſhwood, furze, broom, or other ſhrubs, than for paring off the ſurface of a field free of theſe incumbrances. This inſtrument is, however, common in the ſouth-weſt parts of England; and although it no doubt retains, in a great meaſure, the ſhape of theſe inſtruments, which were firſt uſed for the purpoſe in that part of the country, when the lands were in a very different ſtate, yet the labourers who are in the practice of uſing it are able to pare off the ſod with great dexterity and diſpatch. In ſuch other parts of England where the ſod is alſo pared off by manual labour, the ordinary breaſt ſpade, in ſome places called the breaſt-plough, (in Scotland the *ſlaughter-ſpade*), is generally uſed. The iron or cutting part of the breaſt or paring ſpade, is about eight or nine inches long, and from ten to twelve broad, with ſometimes a kind of edge riſing up a few inches at the right hand ſide, which is intended for the purpoſe of cutting the ſide of the turf

turf next to the unmoved ſward. This inſtrument, which is formed with a fine edge, a man forces forward by the ſtrength of his arms, and by preſſing his breaſt againſt that part of the frame or ſhaft which he holds in his hands. In working this ſpade, the labourer cuts the ſods at about an inch or an inch and a half thick, and from ten to twelve broad; and when the ſpade has run under the ſod or furrow to the length of about three feet, he throws it off, by turning the inſtrument to one ſide; and proceeds in the ſame way cutting and throwing over the ſods the whole length of the ridge.

The only other inſtrument uſed for paring the ſod, is the horſe-plough; but of different conſtructions. In ſome parts of the weſt of England, the common plough only is uſed. There the old graſs-fields, when it is propoſed to burn the ſward, are rib or ſtob furrowed, (in the manner deſcribed in vol. ii. p. 289.) about the beginning of winter; and being again croſs-ploughed the following ſpring, the ſods are collected, and managed in a manner different from the common method, and which will be afterwards deſcribed. In the fenny diſtricts on the eaſt coaſts, where paring and burning is practiſed on a large ſcale, they have ploughs of a particular form conſtructed for the purpoſe. Theſe vary from the common ploughs, chiefly in the breadth and ſharpneſs of the ſhare, or ſock, and are admirably

mirably calculated for paring off the ſward or ſod of a field that is level, and where no ſtones, bruſhwood, and hills, or other impediments, obſtruct its progreſs; but where that is the caſe, the breaſt-ſpade, or common team-plough, with a ſmall alteration of the ſhare, will be found entitled to a decided preference, in reſpect to the extent of ground that can be pared, and the ſuperior manner in which the work in fields ſo incumbered can be performed.

April, May and June, are the months in which the greateſt quantity of land is pared and burned; the particular period depends much on the ſtate of the weather, and the farmer's intention in regard to the crop to be afterwards cultivated.

For accompliſhing a work of this nature with the greateſt diſpatch, and alſo with the leaſt trouble and expence, a dry ſeaſon is obviouſly the beſt. The prudent farmer ſeldom embarks in the undertaking, unleſs there be a reaſonable probability of his accompliſhing it while the weather keeps dry and favourable. The beginning of June, when the hurry of the ſpring ſeed-time is over, and when numbers of hands can be moſt eaſily procured, may, upon the whole, be conſidered in every reſpect the beſt and moſt convenient ſeaſon.

The crops that are made to ſucceed paring and burning are various; and, as has been obſerved,

ſerved, the ſeaſon for performing the operation, muſt depend in ſome meaſure on the farmer's choice of the ſpecies of ſeed to be ſown. If barley or oats, for inſtance, be to be ſown, the paring and burning muſt be completed as early in ſpring as the ſeaſon will permit. When rape or turnips, which are the moſt prevailing crops in ſuch caſes, are to be cultivated, the end of May or the beginning of June, is the moſt proper time; and when lands are pared and burned as a preparation for a crop of wheat, July, or even the beginning of Auguſt, may anſwer in favourable ſeaſons.

In the management of the ſods after they are ſeparated from the ſoil, there is alſo conſiderable difference. This ariſes from the different methods adopted for performing the operation.

When the land is rib-furrowed, which in Cornwall and Devon is called "ſkerting," it is allowed to lie ſome time, that the graſs and weeds may rot. The field is then croſs-ploughed, and afterwards harrowed and rolled repeatedly, till a great part of the earth is ſeparated from the graſſy parts of the ſods. Theſe are then collected together by hand, or with iron-headed rakes of a particular conſtruction; and being put into ſmall heaps, are immediately burnt. The particular method of doing which, it is unneceſſary to detail, as the practice is well known,

not

not only in theſe counties, but in every other where imperfect huſbandry prevails.

Many farmers in various parts of theſe kingdoms, who are too indolent, or too ignorant, to cultivate their lands in a proper manner, are obliged, in the courſe of preparing their fields for barley, to adopt nearly the ſame method to extirpate the weeds as that above deſcribed. It is therefore the name "ſkerting and beat-burning," rather than the method of performing the operation, that is peculiar to theſe counties. Many people, in the northern parts of Scotland particularly, are annually employed in ſkerting and beat-burning, while, were they aſked what they were doing, they would anſwer, "collecting and burning the weeds and clods."

When the ſods are pared off with any of the other implements above mentioned, they are immediately ſet on edge to dry. In order to prevent them from falling over, they are uſually placed in a ſerpentine direction, which effectually prevents it. As ſoon as they are in a condition for burning, which happens ſooner or later, according to the nature of the ſoil, the quantity of ſap in the ſods, and the ſtate of the weather, they are put into heaps to be burned. This is done in England in various ways, which it would be tedious to mention; but as, in very many inſtances, it is done in an improper manner, it may tend to the information of thoſe who con-

ſider ſod-burning as an eſſential part of good management, to peruſe the celebrated M. du Hamel's very accurate account of the manner in which that operation is performed in France.

"In forming the furnaces, they begin with "forming a ſort of cylinderic tower, of betwixt "three and four feet diameter. As the walls of "this little tower are made of the turfs, their "ſize determines the thickneſs; but in building "them they always lay the graſs downwards; "and they make a door about a foot wide on the "windward ſide. On the top of this door they "lay a large piece of wood, which ſerves as a lin-"tel. Then they fill the inſide with ſmall dry "wood mixed with ſtraw, and finiſh the fur-"nace by making a vault of the ſame turfs like "the top of an oven.

"Before the vault is entirely finiſhed, they "light the wood that fills the furnace, and then "immediately cloſe up the door with turfs, and "ſtop the opening that was made at the top of "the vault; taking care to lay turfs on all the "places where the ſmoke comes out too plenti-"fully, juſt as the charcoal makers do; for with-"out that precaution the wood will conſume "too faſt, and the earth not be ſufficiently "burnt.

"If you were to cover the furnaces with "earth, all the crevices being too cloſely ſtopt, "the fire would be extinguiſhed; but by uſing

"only

" only turfs, and always laying the grafs down-
" wards, there is air enough to keep the fire
" burning.

" When all the furnaces are made, the field
" ſeems covered with little hay cocks ranged in
" quincunx's; but you muſt watch the furnaces
" till the earth is red hot, to ſtop with turfs any
" cracks that may happen, to repair ſuch as may
" be in danger of falling, and to light again ſuch
" as may be extinguiſhed.

" When the earth ſeems all on fire, they want
" no farther care; even rain itſelf, although be-
" fore much to be feared, will not hinder their
" being ſufficiently burnt; ſo you have no-
" thing more to do, but to let them go out of
" themſelves.

" At the end of twenty-four, or twenty-eight
" hours, when the fire is extinct, all the heaps
" are reduced to aſhes, except ſome of the tops
" that will remain not ſufficiently burnt, they
" not being enough expoſed to the action of the
" fire; and it is for this reaſon, that we adviſe
" not to make the furnaces too big, becauſe the
" walls being proportionally thick, the outſide
" of the turfs will not be done enough, when
" the inſide is overdone; for, if you burn them
" like bricks, they will not be fit for vegetation:
" Beſides, in making large furnaces, you will
" have too far to carry the turfs.

" When

"When the furnaces are cooled, they wait "till it rains, and then ſpread the burnt earth as "ſoon as poſſible, leaving none on the ſpots "where the furnaces ſtood; which, nevertheleſs, "will produce finer grain than the reſt of the "field: For which reaſon, they leave only ſuch "turfs as are not burnt enough on thoſe ſpots *."

The turfs or ſods being reduced to aſhes, the farmer's next object is to have them carefully ſpread over the ſurface of the field. This is done with as much expedition as poſſible, after the fires are extinguiſhed; it being conſidered a neceſſary part of good management to prevent the valuable particles of the aſhes from being exhaled, by lying expoſed too long to the influence of the weather; and, for the ſame reaſon, the field receives a ſhallow ploughing immediately after the aſhes are ſpread. Thoſe farmers who are more than ordinarily attentive in this reſpect, only rib or ſlob-furrow the field, ſo that the aſhes may be got covered up with the greater expedition and diſpatch. The ſoils that have been formerly under cultivation, moſt proper for paring and burning, are thoſe of a cold or a wet clayey nature, ſuch eſpecially as produce aquatic plants, or where ants chuſe to take up their abode. Light friable ſoils are every where conſidered unfit for being treated in this way; but on any ſort of ſoil which had not before

* Mill's Practical Treatiſe of Huſbandry, p. 46.

fore been reclaimed from a ſtate of waſte, and where furze, broom, brambles, ferns, ruſhes, &c. abound, theſe operations, when properly performed, are productive of the moſt beneficial conſequences. There are few points that have been more controverted, than whether paring or burning is a beneficial practice, or the contrary. There is perhaps no other method that could be deviſed ſo well adapted for preparing land, in a ſtate of nature, and incumbered with bruſh-wood, ruſhes, &c. for valuable crops with expedition and certainty; and on that account, paring and burning might well be conſidered by Virgil, and other ancient writers, as ſure means of improvement.

That, in ſuch caſes, they are ſo at this day, may be proved by the concurring teſtimony of thoſe to whoſe lot it falls to cultivate the common or waſte lands in many of the new incloſed pariſhes in England.

Inſtances the writer has repeatedly ſeen of the greateſt advantage reſulting from this mode of management; and wherever land is rendered unfit for cultivation, by the incumbrances before mentioned, the Devonſhire mattock, and the paring ſpade, may be uſed with the greateſt propriety. Thus far the writer is diſpoſed to go with thoſe who applaud paring and burning as the greateſt of all modern improvements, and of which Mr Young thus writes:

"Whatever

"Whatever objections have been made to the "husbandry of paring and burning, have either "been the result of theoretical reasonings on "false principles, or else founded on facts fur- "nished by very bad farmers *."

In respect to paring and burning, without relation to the antecedent or posterior management of the land, there seems little reason to believe that it is attended with the bad consequences that some people are apt to suppose. It has been maintained very strenuously, that the action of fire tends to lessen the quantity of soil. This can only happen to any degree from mismanagement in conducting the process of burning, and that too in particular soils. All soils must, for a time, be lessened in bulk to a greater degree by paring off the surface, and reducing it to ashes, than by the ordinary methods of cultivation; as although weeds may be completely destroyed by summer-fallow, or by horse and hand-hoeing, yet as the most minute particles of soil imbibe a certain portion of moisture, that which is not subjected to the action of fire must be greater than that which has been in a kind of furnace for twenty or thirty hours.

In this view, the soil of a field that has been pared and burned, must be lessened in bulk or depth,

* General View of the Agriculture of the County of Suffolk, p. 31.

depth, till ſuch time as the aſhes are incorporated with the other ſoil, and again diſtended by the moiſture which they imbibe; but this decreaſe in the depth of the ſoil can only take place for a ſhort period; and as thoſe who are in the practice of paring and burning, are in the practice alſo, in general, of exhauſting the lands immediately afterwards, by a ſucceſſion of ſevere crops, there is no reaſon to fear that the decreaſe in the depth of the ſoil, ariſing from the deſtruction of the weeds, will be of long continuance; as, in a ſhort time, the rapid increaſe of their roots and fibres will ſoon raiſe the ſurface to its former level. Clay ſoils are much more apt to be reduced by paring and burning than any others. When the flame in the heaps is allowed to burſt out with great violence, the ſoil is apt to be reduced to a bricky ſort of ſubſtance, incapable either of imbibing any quantity of moiſture, or of again becoming uſeful in promoting the growth of plants; hence, in ſo far as miſmanagement takes place in this reſpect, in ſo far is the depth of ſoil permanently leſſened. But, were paring and burning to leſſen the ſoil to the degree which ſome people aſſert, there would not have been an inch of ſoil in the counties in the ſouth-weſt part of the iſland many ages ago. This argument, therefore, againſt paring and burning, does not appear to carry much weight along with it. It is, no doubt, very ſpecious

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and plauſible in theory; but the practice of ages has proved it, in a great degree, ill-founded.

That paring and burning is an expeditious method of reducing lands to a proper ſtate for producing crops, and that a large quantity of valuable manure is alſo thereby procured, are arguments always uſed by thoſe who wiſh to impreſs the public with a favourable opinion of this mode of management. There is no queſtion but both theſe facts are well eſtabliſhed; but they ought only to be admitted as ſolid arguments to eſtabliſh the general point in a certain degree.

The permanent advantage of paring and burning, in regard to the acquiſition of manure thereby procured, is extremely doubtful; as although it operates as a ſtimulus, and creates an unnatural, becauſe a violently forced, exertion for a ſeaſon or two, yet its effects, eſpecially if frequently repeated, prove ultimately ruinous, as has been found in very many inſtances. There appears therefore, no ſubſtantial reaſon for aſſerting, on the one hand, that paring and burning has the effect to reduce, in any perceptible degree, the depth or quantity of the actual ſoil, at leaſt for any length of time, and it is equally clear, on the other, that land, in a proper ſtate of management, can be made to produce, for a term of years, much more valuable crops by ploughing,

ploughing, harrowing, and the application of manure in the ordinary way, than can be forced from it by the application of fire, which, like a very powerful medicine, improperly applied, is more likely to kill than to cure.

Admitting that paring and burning is in many caſes the beſt, the moſt expeditious, and, upon the whole, the cheapeſt way in which waſte lands can be improved; and that, under proper management, it may rather be conſidered as an uncommon method, than as one either greatly beneficial or prejudicial to the ſoil, let us inquire wherein conſiſts the neceſſity or propriety of the general eſtabliſhment of this practice, by ſome ſo ſtrongly recommended. By this inquiry, taken in conjunction with what has been ſtated, we ſhall be able to determine, whether it is on account of the utility of the practice itſelf, or to the imperfect ſtate of huſbandry in thoſe diſtricts where it is adopted, or where the introduction of it is recommended, that it is denominated, when properly managed, "the "moſt admirable of all improvements."

Every perſon muſt admit, that the neceſſity of paring and burning old cultivated lands implies previous neglect or miſmanagement; as lands under a proper courſe of cultivation, and of general management, can be rendered fit for yielding large crops by the more ſimple and leſs expenſive operations of the plough and the harrow.

Paring and burning is recommended only in an eſpecial manner, as means of improving cold four paſtures, abounding with aquatic plants, or ſuch as are over-run with furze, broom, fern, ant-hills, &c. In other words, for ſuch lands as from the imperfect ſyſtem of huſbandry adopted, or the abſurd policy of the landlords in debarring their tenants from breaking up theſe paſtures in proper time, are in ſome meaſure returned to a ſtate of waſte.

However much it may ſurpriſe thoſe who have had no opportunity of making this the ſubject of inveſtigation, and however low it may ſink Engliſh huſbandry in the opinion of the reader, yet it is unqueſtionably true, that a very great proportion of the beſt, and naturally the moſt fertile of the old incloſed lands in England, that have been long occupied as paſturage or graſs-lands, are comparatively waſte and unproductive, and ſtand as much in need of improvement, either by fallowing, or by paring and burning, as the waſtes and commons in the more level parts of the kingdom. In proof of this, it is only neceſſary to quote the report of the proceſs of paring and burning made by the Secretary of the Board of Agriculture, as practiſed in Suffolk. "In theſe fens (the fens of Suffolk) "the original ſurface is rough and unequal, "from great tufts of ruſhes, &c. called haſſocks. "Some perſons cut them with ſpades, at the ex-

"pence

"pence of five or ten ſhillings the acre; others "with the plough. Paths for the horſes were "in that caſe to be cut by hand, and the plough "made on purpoſe, and called a Haſſock Plough." But from ſo reſpectable authority, it would ſcarcely gain general credit, that in thoſe times ſome of the moſt valuable lands in the iſland were allowed to return ſo nearly to their original ſtate, as to require manual labour to precede the plough. It muſt alſo be obſerved, that this account does not apply to Suffolk alone; it is a deſcription alſo of the actual ſtate of much valuable land in other parts of that kingdom. This circumſtance, when explained, accounts in a very ſatisfactory manner for paring and burning being recommended ſo often and ſo ſtrongly, as means of improving lands that had been formerly in tillage. For the reaſons already mentioned, paring and burning ſeems the beſt, indeed the only method that can be adopted for bringing ſuch lands into a proper ſtate for cultivation. But on what principle proprietors permit their tenants, after paring and burning, to exhauſt the ſoil by overcropping, and then to allow it to remain neglected till it becomes equally waſte and unproductive as before, it is impoſſible to determine. Such a practice is evidently beneficial for the tenant, but muſt be injurious to the landlord; for, in the language of ſome diſtricts, where paring and burning is common, "however good

"it

" it may be for fathers, it is certain ruin to " ſons."

From the above account of the imperfect, or rather abſurd manner in which a great ſhare of the old paſture-lands in England are managed, may be inferred, that paring and burning is recommended, becauſe it is really the only, as well as in the opinion of the advocates for it, the beſt means that can in ſuch circumſtances be adopted. Fallowing, by which lands of a light friable nature, when the bruſhwood and other ſhrubs are removed, might be eaſily reduced to a pulveriſed ſtate, will not, without much time and labour, prove effectual for reducing ſtrong adheſive ſoils, the ſurface of which is matted together by the roots of ruſhes, and other acquatic plants. That being the caſe, the poſſeſſors of ſuch lands are under the neceſſity of uſing the means adopted by the firſt improvers; and where lands are allowed to remain ſo long in graſs, as to be overrun with furze, ruſhes, &c, paring and burning muſt ſtill hold their ranks in the liſt of eſſential means of improvement. But let it be remarked, in the words of a provincial writer on agriculture, who ſeems to be fully ſatisfied, from experience, of the ruinous conſequences reſulting from repeated parings and burnings, " that if this practice ſhould be at any time *neceſſary*, in order to get free of a variety of coarſe productions which cannot be ſubdued by any other means,

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it ſhould ever after be abandoned, as being a practice highly prejudicial to a farmer's intereſt, *and one that has idleneſs and ſloth for its parent, and poverty for its offspring* *."

Were lands cultivated and managed in the manner that would render them to the greateſt poſſible degree productive, (in alternate courſes of grain and graſs-huſbandry), the operations of paring and burning would be rendered unneceſſary, *and if not impoſſible, at leaſt extremely difficult* to accompliſh, as the ſward or turf of a field that had been ſown out with graſs-ſeeds in high condition, and free of weeds, would be ſo tender, as ſcarcely to have toughneſs ſufficient to keep it together while undergoing the operations of paring, ſetting, &c. Mr Young, in a letter to the Secretary of the Bath Society, on the beneficial conſequences of introducing turnip crops, to the excluſion of fallows, remarks, that as improvements take place in the weſtern counties, ſummer-fallowing oftener than common, will be eſteemed an improvement; and adds, "an improvement with which the farmers in that part "of the iſland, like thoſe of Scotland, may ſit "down ſatisfied †." It was formerly obſerved, that many of the proprietors of Scotland had got a ſtage beyond fallowing, on the road towards perfection

* See Report of Lincolnſhire, p. 69.

† Bath Society's Letters and Papers, vol. ii. p. 64.

perfection in agriculture, by covenanting with their tenants, to ſubſtitute horſe and hand-hoed green crops, in place of fallow. It was alſo remarked, in the former part of this ſection, that the practice of paring and burning, was almoſt univerſally exploded in that kingdom. It may here be proper alſo to remind the reader, that except around the houſes of the proprietors, there is little or no old graſs lands in the better cultivated parts of Scotland, over-run with ſhrubs, weeds, and ant-hills. This remark is not made with a view of placing the general agriculture of Scotland in a ſuperior point of view to that of England; but in order to ſhow the good conſequences that would neceſſarily reſult from an alteration of the preſent mode of managing graſs-lands in the latter kingdom, by which only paring and burning, like fallowing, can be exploded with propriety.

In the Carſe of Gowrie, than which there is not a diſtrict in the Iſland where tillage, and every thing that reſpects the cultivation of grain, is better underſtood, or more judiciouſly performed, the ſyſtem of outfield and infield huſbandry was univerſally eſtabliſhed, within the memory of many perſons now living. Then haſſocks, ruſhes, and all other weeds that proſper in cold wet ſoils, were to be found in abundance in all the outfields, which under that ſyſtem, were only broken up, for a crop or two, every

every eight or ten years. Now the caſe is materially altered for the better; thoſe impediments to good cultivation have diſappeared. The diſtinction of outfield and infield, has ſunk into oblivion. The rents are in many inſtances tripled. Valuable crops are annually produced; very many of the tenants are in an eaſy ſtate of independence; and all this has been effected by the ſimple operations of the plough, and of the harrow, and without having had recourſe, but in very extraordinary caſes, to paring and burning.

In ſhort, it is not the excellency of the means, nor the permanent advantages derived from the uſe of them, but the erroneous ſyſtem under which the old paſture-lands in England are managed, that renders paring or burning neceſſary, or, when repeated, at all excuſable; and when as great an alteration in that reſpect, ſhall happen in that kingdom, as has taken place in the Carſe of Gowrie, paring and burning, like infield and outfield, will become obſolete terms.

CHAP-

CHAPTER XXVIII.

Irrigation, or the Watering of Land.

HAVING taken up ſo many pages in deſcribing the various methods by which lands may be freed from ſuperabundant water, ariſing, either naturally from the bowels of the earth, or ſpreading over the ſurface by the overflowing of rivers, it may appear ſurpriſing to ſome that the writer's next object ſhould be to direct the farmer's attention to the proper methods of bringing water over thoſe fields by art, which may be ſuppoſed to have required ſo much art as well as expence to have made dry.

The beneficial practice of watering or flooding land by artificial means, has been eſtabliſhed in ſome particular diſtricts, as Wilts, Hants, Devon, Dorſet, &c. for many ages, at leaſt beyond the period that memory or tradition reaches.

The idea muſt no doubt have been firſt ſuggeſted, or the theory formed, from obſerving the effects of the operations of nature in this reſpect.

Theſe are no doubt more conſpicuous in other countries than in this. Whoever has heard of the remarkable fertility of the lands of Egypt, muſt alſo have been informed, that it chiefly ariſes from the annual and regular inundation of the Nile. That river (during flood) after traverſing immenſe territories in its courſe, with inconceivable impetuoſity, at laſt diverges gently over the plains of Egypt, depoſiting there the valuable particles of vegetative earth which it waſhed away from the adjoining lands in the courſe of its paſſage. In this country the duration of the floods is ſo ſhort,—the courſes of the rivers for the moſt part are through ſuch barren and unproductive tracts,—and the ſoil and climate are ſo inferior,—that effects ſimilar to thoſe diſcernible from the overflowing of the Nile cannot be expected to take place. But that perſon muſt indeed be a ſuperficial obſerver of nature, who has not diſcovered that vegetation is earlier, and the crops of graſs more abundant, on the margins of ſtreams and brooks that are occaſionally overflowed, than on thoſe parts of the ſame field that, from their more elevated ſituation, or greater diſtance from the water courſe, partake not of the fertilizing benefits which water gliding over graſs land, with ſome degree of ſwiftneſs, is known to impart.

This circumſtance having catched the attention of ſome farmer more obſervant than his

neighbours, was moſt probably the firſt cauſe of endeavouring to effect, with more certainty and ſucceſs, by art, what nature on many occaſions performed very imperfectly; and was the means of giving riſe to the introduction of what may be called, Artificial Water Meadows.

In China, the artificial watering of land is ſaid to be carried on to ſuch an extent, and to produce ſuch beneficial effects, as we in this country can hardly form any idea of. In ſome of the Weſt India iſlands, alſo, and in the ſouthern part of North America, this practice is very generally eſtabliſhed: The ſugar canes and rice fields are regularly and abundantly watered by art, when, from the failure of the periodical rains, the crops are in danger of being injured.

Before deſcribing the method of performing this operation, many particulars connected therewith require to be explained; as,

I. The Lands capable of being watered.

II. The Soils proper for being watered.

III. Preparations neceſſary previous to introducing water on Meadows.

IV. The different ſorts of water that prove more or leſs uſeful for watering Land.

I.

I. The Lands capable of being irrigated,—it will occur to every reader, are thoſe that lie in low ſituations, adjoining to rivers or ſtreams, or in a ſloping direction on the ſides of hills, to which water can be carried by a lead or drain, from a river, ſtream, or ſpring, running in a more elevated channel, at a little diſtance. The former are denominated *Flowing Meadows*, the latter *Catch-work Meadows*.

II. The Soils proper for being watered.—All ſoils are not equally benefited by irrigation. Thoſe that are of a ſandy friable nature are the moſt proper, as the improvement is not only immediate, but the effects more powerful than on other ſoils. Strong adheſive four wet ſoils, ſuch as are moſt prevalent in the neighbourhood of large rivers, are alſo capable of being improved by watering; but the effects are neither ſo ſoon diſcernible as on thoſe before mentioned, nor will the watering of ſuch lands prove ſo profitable to the farmer, (whatever it may do to the proprietor,) in conſequence of the very heavy expence to which he muſt, in many caſes, be ſubjected by previous draining. Another circumſtance, in regard to the different ſoils that may be benefited by irrigation, requires notice, namely, that the more tenacious the ſoil, the greater ought to be the command of water. A brook or ſtream, capable of watering ten or twenty acres of light and naturally dry land, would prove

prove but in a very ſmall degree beneficial, if applied to the watering of half that extent of cold clay ſoils, ſuch as in their natural ſtate produced more ruſhes than other plants. All ſoils of this laſt deſcription require a conſiderable body of water for the purpoſe of floating them, ſo as to produce the wiſhed for effect. Where that cannot be procured, this mean of improvement will in few inſtances anſwer the farmer's expectation, or turn out profitable.

III. Preparations neceſſary previous to introducing water on meadows.—Before attempting to improve meadows, or other lands, by the application of water, it becomes the farmer's buſineſs to aſcertain, that both the ſoil and ſubſoil are either naturally dry, or have been made completely ſo by means of open or under drains. It is found in practice, that unleſs lands be thoroughly drained they cannot be improved by watering; and of courſe the previous operation of draining is conſidered indiſpenſably neceſſary, before fields in which there is a ſuperabundance of moiſture can be flooded with any probability of ſucceſs. As the perfection of a water meadow conſiſts in the farmer having it in his power to bring on or take of the water at pleaſure, it neceſſarily follows, that a complete power of drainage is as requiſite as the command of water. The period which meadows are allowed to remain floated, and how often it is conſidered neceſſary

ceſſary to repeat the floating, depends on various circumſtances, that will hereafter be explained; but as, after every floating, the floaters, drowners, or watermen, (for by all theſe appellations the labourers who are employed in the operative part of the buſineſs are known,) are extremely careful to drain off the water from every part of the field; and, as the moſt injurious conſequences are known to ariſe from any degree of negligence in this reſpect, it would be expending money very unneceſſarily to prepare a field, at a great expence, for being floated, unleſs it were previouſly aſcertained that ſufficient declivity or outfal could be procured, for carrying off the water, when its longer continuance would be attended with bad effects: Therefore, in forming a water meadow, the drain that is to carry off the water, when it is no longer neceſſary, or when its longer continuance would prove prejudicial, ſhould be as carefully attended to, in the conſtruction, as that by which the water is to be ſuperinduced. The forms and uſes of the other cuts, conveyances, or carriages of a water meadow, will be taken notice of when deſcribing the practical part of the operation, and alſo the difference between a flowing or floating meadow, and one that is watered by what are called Catch-work drains. The next particular in order is

IV.

IV. The different ſorts of water that prove more or leſs uſeful for watering land:—That water poſſeſſes different qualities, is known more or leſs to every perſon; but in what manner it acts, ſo as on many occaſions to produce ſuch wonderful effects, in regard to what may not improperly be called Premature Vegetation, is more the province of the chymiſt than of the practical farmer to aſcertain. That the qualities of the different ſorts of water, as iſſuing from rocks, from chalk, or from ſwamps, and the effects of each when employed in irrigating particular kinds of ſoil, may in time be determined with conſiderable accuracy, there is no reaſon to entertain a doubt. Many experienced chymiſts of the preſent day are making it their ſtudy to combine chymiſtry with agriculture, and to ſuch this is a wide field for inveſtigation. Their individual labours, while amuſing and inſtructing to themſelves, may, and moſt probably will, when communicated to the public, tend to throw much light on this hitherto rather neglected art. There are few objects to which they can direct their attention, where that attention may be more uſefully employed, than in inveſtigating the nature and properties of the different ſorts of manures, of which water, when thus applied, will be found to hold a diſtinguiſhed rank. By the labours of theſe gentlemen, the watering, or flooding of land, may in time be reduced ſo completely to a

ſyſtem,

ſyſtem, that the practical farmers of future times may be able, from the inveſtigation, practice, and experience of others, to decide with accuracy and preciſion, in what ſituations, on what ſoils, and by what ſorts of water, the watering of land is likely to be attended with the greateſt ſucceſs, and on what occaſions alſo the attempt would be improper, becauſe likely to prove abortive. All that is at preſent known with certainty, in regard to the ſort of water beſt ſuited to the purpoſe, muſt be collected from the ſucceſs that attends watering land in ſome diſtricts beyond that in others. From what was mentioned reſpecting the remarkable fertility of Egypt, in conſequence of the ſtated overflowings of the Nile, it may be inferred, That the water of rivers when in flood, muſt be the beſt of all others for the purpoſe, eſpecially if their courſes be through extenſive fertile tracts of country, where every little ſtream, rivulet, and brook, adds an acceſſion of the richeſt mould, which, being depoſited on the ſurface of the meadows, cannot fail to act as manure, and to give new energy to the vegetative powers of the ſoil.

In regard to water iſſuing from ſprings, it was formerly mentioned, that the counties of Wilts, Hants, Devon and Dorſet, are the diſtricts where watering of land is practiſed to the greateſt extent; and it will alſo be found, that there its effects are more remarkable, than in others that abound

abound with water ariſing from ſtrata different from thoſe prevalent in the above mentioned counties.

The hills in theſe counties abound with chalk, gravel, or a ſlaty mouldering kind of rock, containing probably a conſiderable portion of calcareous earth; and as the water that iſſues from theſe hills is known, from practice, to be better adapted for the purpoſe than what ariſes in the ſame diſtricts from bogs, peat-moſſes, or moraſſes, it is probable that the water in the one caſe is impregnated with a greater proportion of vegetative principle than what the other poſſeſſes. Without this be admitted, it is impoſſible to account for the difference in the effects often ſo viſibly produced, from watering one field from a ſpring iſſuing from a chalk hill, beyond what takes place in another, ſimilar in every reſpect, and managed in the ſame way, excepting that the water applied ariſes in, or flows through, a ſwamp or moraſs, compoſed chiefly of peat-earth; or proceeds from a hill or mountain known to contain metallic ſubſtances. From whatever cauſe it may ariſe, the fact is unqueſtionably eſtabliſhed, that the water of rivers which run through comparatively level and fertile countries, is not only better than that of ſuch as have their courſes through mountainous unproductive tracts, but ſuperior to all others.

Secondly,

Secondly, that water iſſuing from chalk, friable rock, or gravel, is much ſuperior to that from ſwamps and moraſſes. And thirdly, that the water which iſſues from hills containing metallic ſubſtances, is, to a certain degree, deſtructive of the principle of vegetation, when applied to any ſoil.

Although the writer has ſeen the practical part of the buſineſs conducted in all its branches, and on more occaſions than one, yet he is ſenſible that neither he nor perhaps any other perſon is able to give a particular deſcription of it, without giving alſo a ſet of plans repreſenting all the various parts of the works, ſo as the one might elucidate the other. This having been done by a much abler hand, Mr Boſwell of Dorſetſhire*, ſome remarks on the general management ſhall only be attempted. Theſe may be agreeable to the generality of readers, while a minute detail could be intereſting only to a few.

Watered Meadows, properly ſo called, are flat low-lying lands, that may be overflowed by water direct from the river, or on which water may be brought in conſiderable quantities by

* Thoſe who are anxious for particular information, in regard to the moſt approved method of watering land, the writer begs leave to refer to Mr Boſwell's treatiſe on that ſubject, which contains more real information reſpecting the practical part of watering land, than probably any other in the Engliſh language.

a cut or main drain, made to conduct it from the river or ſtream, and which is branched off from the river, at a higher level than the ſurface of the meadows if flat, or of the top of the ridges, if the meadows be formed into ridges as a preparation for watering the grounds with effect. The water being conducted by a main drain or carriage, as it is technically called, to the neareſt end of the meadow, it is there branched out into a number of cuts, made for the purpoſe, along the tops of the ridges. Theſe cuts being filled with water from the main drain and being conſtantly ſupplied by water forced into them from the main cut, which, wherever it is poſſible, is made to run with a conſiderable degree of rapidity, they every where overflow their banks, ſo that a general flood enſues over the whole, or ſuch part of the meadow as ſufficient water can be procured for at once. In all the watered meadows that are ridged up, there are drains in each furrow for receiving the water that runs over the edges of the little cuts that are made on the tops of the ridges. The water, as it falls into the drains in the furrows, runs off into what is called the great tail drain, and is either made uſe of to water ſome adjoining field or reconducted again to the river or ſtream by another channel; ſo that in a very ſhort time after the inlet or carriage drain is ſtopped, the field, when properly formed, becomes as dry

as

as before: To effect which, with the greater diſpatch, croſs cuts or drains are made from thoſe on the tops of the ridges, ſo that the water from theſe laſt mentioned cuts is conducted into the drains in the furrows as ſoon as the carriage drain is ſhut.

The cuts neceſſary to be made on a meadow irregular in ſurface, and where an abundant ſupply of water cannot be procured, can only be determined by the ſkill of the flooder; but when it is remarked, that in every ſuch caſe it is deemed eſſentially neceſſary that the water ſhould ſpread over the whole, and as equally as poſſible, it may eaſily be conceived, that before a large quantity of water, divided into ſo many parts, can operate over the ſurface of ſeveral acres at once, theſe cuts muſt be, like the veins and arteries in the human body, conſiderable in number and very variouſly placed.

Catch-work Meadows are ſuch graſs and paſture lands as lie on the ſides of hills, and are capable of being watered, by conducting the water of ſome ſtream or ſpring round the edges of the hills. The mode of watering lands ſo ſituated, is very different from the former, as fewer cuts or channels are neceſſary. Theſe are cut as nearly in parallel lines, one below the other, as the level ſidewiſe along the bank will permit. The water having arrived at that part of the main carriage, or main channel, on the top

of

of the meadow, it begins to run over its lower ſide, and after overſpreading all the ſurface in its courſe, falls into the channel or cut immediately below; that becoming full, in a ſhort time runs over in the ſame manner, and ſo on, till the water at laſt arrives at the bottom of the field, where it falls into a drain, formed for the purpoſe of carrying it away to ſome adjoining river, or perhaps to float ſome low lying meadow.

As it is generally underſtood that the greater the ſlope, and the more lively the motion of the water, the more evidently will the effects of watering be diſcernible, one would be led to ſuppoſe that catch-work watering would be ſuperior to the other mode. Practice and experience have however proved the contrary; and thoſe who are moſt ſkilled, and who have had the moſt extenſive practice in the watering of land, recommend catch-work watering as a ſecondary mean of improvement only. The reaſon aſſigned is, that the water is ſo repeatedly ſtrained over the ground, that the flooders or watermen do not conſider it ſo enriching as before it was uſed. "And therefore," ſays Mr Boſwell, whoſe experience and practice in the buſineſs entitles him to the greateſt credit "nothing but abſolute neceſſity can ſupport the adopting it."*

The

* See Mr Boſwell's Treatiſe on watering meadows, P. 27.

The expence of forming meadows in a manner proper for being watered with the greateſt effect, is in either caſe conſiderable. In forming a meadow for flooding, there are uſually ſo many cuts beyond what are requiſite in catch-work meadows, that the firſt coſt is very frequently more than triple; and the regular annual charge for cleaning out the cuts, and keeping the whole works in order, is alſo much increaſed. The expence of forming a flowing meadow varies, from ſix or eight to twenty pounds the acre; that of a catch-work meadow, from three to ſix or ſeven; and the annual expence of repairing implements and of manual labour, from five to ten ſhillings the acre.

The expenditure of ſo much money implies, that great and permanent advantages are derived from watering meadows. That this is the caſe when the ſoil and the water are both proper for the purpoſe, is perfectly eſtabliſhed; although the advantage derived from watering ſome ſoils, when compared with that reſulting from adopting the ſame means of improving others, is by every account very ſmall; ſo much ſo, that in many caſes, if the account of the expences and of the abſtract benefit thus derived were fairly ſtated, the balance would not be great either way. Such inſtances however may be conſidered as rare; and on that account watering meadow land may be generally ſaid to be a material

material improvement, in every part of the iſland where permanent meadows are common, whether hay or paſturage be the object.

Meadows are uſually watered at two ſeaſons in the year, or rather they are watered occaſionally during winter and ſpring; that is, from the beginning of November till the beginning of March. The length of time which water ſhould be allowed to flow over meadows cannot be determined by any general rules. The nature of the ſoil, the ſeaſon of the year, and the practice and experience of the flooders, can alone regulate this particular. The practice of ſome diſtricts is to allow the water to flow over the fields in winter, for ſeveral weeks together, with the interval only of a day or two, now and then. In others they are floated one week, and allowed to remain dry the next; and ſo on for ſeveral weeks together. Sometimes the operation of floating is in a great degree ſuſpended by froſt, the whole ſurface being covered with one ſheet of ice. When that happens, and when the froſt continues for any length of time, it is obſerved, that the ſucceeding crop of graſs is remarkably abundant. In ſpring floating, when the temperature of the water and of the air becomes more mild, a much ſhorter period is neceſſary; a few days now and then is found perfectly ſufficient. But whether the water be kept on long or ſhort, all thoſe who are converſant in the

the buſineſs are agreed, that it is an indiſpenſable part of good management to lay the meadows thoroughly dry between every watering, as without that be done half the benefit that might otherwiſe be expected will not enſue.

Watered meadows are uſually paſtured in the ſpring with ſheep, and as the graſs is remarkably forward in March and April, when no other green food can be procured, it becomes almoſt invaluable to thoſe farmers who keep flocks of ſheep, either for breeding or fattening. About the end of April, after being again flooded, they are ſhut up during ſummer, and the crops mown for hay. In autumn the after-graſs is eat off with cattle, it being conſidered, and indeed found from experience, to be certain deſtruction for ſheep if they are permitted to paſture on watered meadows for a ſingle day at that ſeaſon. A remarkable inſtance of this is detailed in the report of the county of Suſſex, in the following words: "If wethers or ewes, before lambing, "were turned in, they would certainly die. "Eighty ewes from Weyhill fair were turned "into ſome land adjoining to a watered mea- "dow, it happened that a ſcore of theſe acci- "dentally broke into the meadow for a night; "taken out the following morning, they were "all kept till lambing; the ſcore that had broke "looſe, produced twenty two lambs, all which "lived, but every one of the ewes died rot- "ten before May-day; the remaining ſixty "made

" made themſelves fat, nor could a rotten ſheep " be diſcovered amongſt them; ſeveral of theſe " were put into the meadow with their lambs, " but received no injury." Why the graſs of watered meadows ſhould prove ſo nouriſhing food for ſheep in the ſpring, and ſuch certain deſtruction to them in autumn, the writer does not pretend to determine; but that the fact is ſo, in every diſtrict where water meadows are common, is eſtabliſhed beyond the poſſibility of a doubt. It becomes therefore indiſpenſably neceſſary for thoſe who are as yet unpractiſed in the buſineſs of water meadows, to guard their flocks with the moſt ſedulous attention from approaching theſe meadows, in the autumnal or winter months.

The effects of watering meadows, in producing an early and luxuriant vegetation, when the ſoil and the water are proper, and when the operation is performed in a proper manner, are truly aſtoniſhing. But the difference between a watered and unwatered meadow, in theſe reſpects, can beſt be determined by compariſon. Thoſe who have had opportunities of ſeeing the piece of ground ſet apart by the late Mr Bakewell, for trying experiments in this branch of huſbandry, muſt at once have diſcerned the benefits reſulting from the proper application of this mean of improvement. Had they extended their ſurveys a little further, they would have diſcovered,

diſcovered, that while the Diſhly fields (none of the beſt in quality) were covered with an almoſt perpetual verdure of the moſt nouriſhing graſſes, thoſe of ſome neighbouring farmers were famous only for the quantity of ruſhes, and other weeds, which they produced.

The advantage of watering meadows, in ſo far as ſpring food for ſheep is thereby procured, (a moſt important matter no doubt,) has already been mentioned. Another, alſo of material conſequence, merits notice.

Beſides manuring a certain portion of the farm, without being obliged to have recourſe to the farm-yard, the lime-kiln, or the marl-pit, the crops are not only ſo much earlier, as to afford an abundant ſupply of food for the ſheep at the moſt pinching ſeaſon, but they are alſo ſo much greater in the after ſeaſon, as, beſides being uſeful for the other ſtock, ultimately to increaſe the dunghil; ſo that the other lands are to a greater degree enriched thereby. In a word, where the ſoil, the water, and the ſituation are favourable, it is a mean of improvement which every proprietor ought to encourage, and every farmer to adopt.

The exertions now making to introduce the practice of watering lands in Scotland, renders it neceſſary to make a few obſervations on the probable conſequences of theſe exertions, or rather on the obſtacles that ſeem to ſtand in the

way of the eſtabliſhment of this beneficial practice in that kingdom. Thoſe which merit moſt attention, are, the quality of the water; the ſituation of the fields; and the open-field ſtate of that part of the country where the attempt ſeems chiefly directed.

If in England it be found, that the nature or quality of the water determines, in a great meaſure, the extent of the improvement that the uſing it in watering land artificially is likely to effect, the ſame conſequences may, from a parity of reaſoning, be expected to take place in Scotland. Therefore, before a general introduction of the ſyſtem be attempted, it appears neceſſary, and a prudent preliminary inquiry, to aſcertain, by compariſon, the extent of the advantages that may be reaſonably expected to reſult. This becomes the more neceſſary, in conſequence of the heavy load of expence that is incurred in making the pre-requiſite preparations. It has already been mentioned, that in the diſtricts in England where the practice of watering land is moſt generally eſtabliſhed, the rivers, ſtreams, and rivulets moſt uſually employed, have their ſources in hills of chalk, gravel, or ſometimes in a flaty, and not unfrequently in a free porous kind of lime-ſtone; and that it is by water iſſuing from hills, whoſe chief component parts will anſwer one or other of theſe deſcriptions, that the greateſt improve-

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ments are effected. There is not a gentleman, proprietor of an eſtate in Scotland, (who has ever been at the trouble to cauſe any inveſtigation be made), but muſt be perfectly ſatisfied, that, whether the water iſſuing from the hills in that kingdom be better or worſe for the purpoſe, it muſt at any rate be different in its nature and quality from that moſt generally made uſe of in England, as proceeding from very different ſtrata, and for the moſt part traverſing barren, neglected, and unproductive diſtricts. Water iſſuing from the hills in Scotland, generally proceeds from a ſtratum either of whin-ſtone, or of an extremely hard lime-ſtone, both of which are equally impervious to that element, and which of courſe muſt be leſs impregnated with fertilizing powers than in either of the caſes before mentioned.

Another circumſtance reſpecting the quality of the water in Scotland for this purpoſe, alſo merits attention. It is very highly probable, that although, owing more to negligence than to any other cauſe, there have not yet been diſcovered many metallic ſubſtances in the hills and mountains of Scotland, yet becauſe that is the caſe, no perſon will pretend to affirm theſe do not contain immenſe ſtores of metals; if they did not, it would be extremely ſingular, as in almoſt every country ſo rugged and deformed in ſurface theſe abound. The proprietors of Scotland

land require not to be informed, that all metals have poiſonous effects on vegetable ſubſtances; and therefore, as the mountains of Scotland do, or do not contain metallic ſubſtances, ſo muſt the waters iſſuing therefrom be prejudicial or ſalutary in their effects, when uſed as means of fertilizing the ſoil.

From what has been ſtated, it is by no means intended to throw out the idea, that watering of land may not prove a beneficial practice, if introduced into the Highlands of Scotland, as well as it has done in many counties in England. But as it is a practice that, when adopted, does not in all caſes, and in every diſtrict, produce alike beneficial conſequences, it is only meant to ſuggeſt the propriety of uſing proper means to eſtabliſh the theory of watered meadows and paſtures on correct principles, ſo far as it relates to Scotland, before the proprietors or farmers embark too deeply in the practical part of the buſineſs. Except this be done, a few unſucceſsful attempts at the beginning may be the cauſe of improvements, well calculated in many caſes to increaſe the produce of the ſoil, and conſequently to augment the rent, in a ſhort time falling into diſrepute. Should the attempt go on, and ſhould failures in practice happen, the cauſes ſhould be accurately aſcertained, as thereby other conſequences, beneficial in their effects, may reſult; as, if the failures ariſe from

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the bad quality of the water, and from its being impregnated with metallic ſubſtances, it may lead to the diſcovery of mines and minerals, which, without ſome ſuch accidental mean of diſcovery, might have remained unexplored for ages.

A great portion of the lands, either in the central Highlands of Scotland, or in what may be called the ſkirts of the mountains, that can be improved by watering, lie in ſuch ſloping directions, that catch-work watering muſt be the prevailing ſyſtem. Reſpecting the inferiority of that mean of improving the ſoil, enough has already been ſaid.

The circumſtance of water-meadow paſtures, being ſo deſtructive to ſheep, alſo merits the attention of thoſe gentlemen, who in Scotland appear ſo anxious to introduce the practice of watering of land. If an imperfect fence be on ſome occaſions productive of ſuch bad conſequences, as thoſe formerly ſtated to have happened in Suſſex, what may not be expected to reſult from a general introduction of this ſyſtem in an open country, and where the farmer's capital is almoſt excluſively veſted in ſheep? That the watering of land may be introduced as a beneficial practice in ſome parts of the Highlands of Scotland, the writer entertains no doubt: But in the preſent open-field, or unincloſed ſtate of that part of the country, added to the uncertainty which indivi-

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duals muſt labour under, in regard to the quality of the water that they have the power of uſing, he is of opinion, that thoſe proprietors or tenants who intend to expend ten or twenty pounds the acre, for putting their lands in a ſituation capable of being benefited by watering, ſhould, in the firſt inſtance, aſcertain the quality of the water; and, in the ſecond place, fence the fields in ſuch a manner as to debar ſheep from entering at improper ſeaſons. Except theſe previous meaſures be adopted, the introduction of this practice, beneficial as it certainly is in ſeveral counties in England, may prove the reverſe in Scotland.

END OF VOLUME THIRD.